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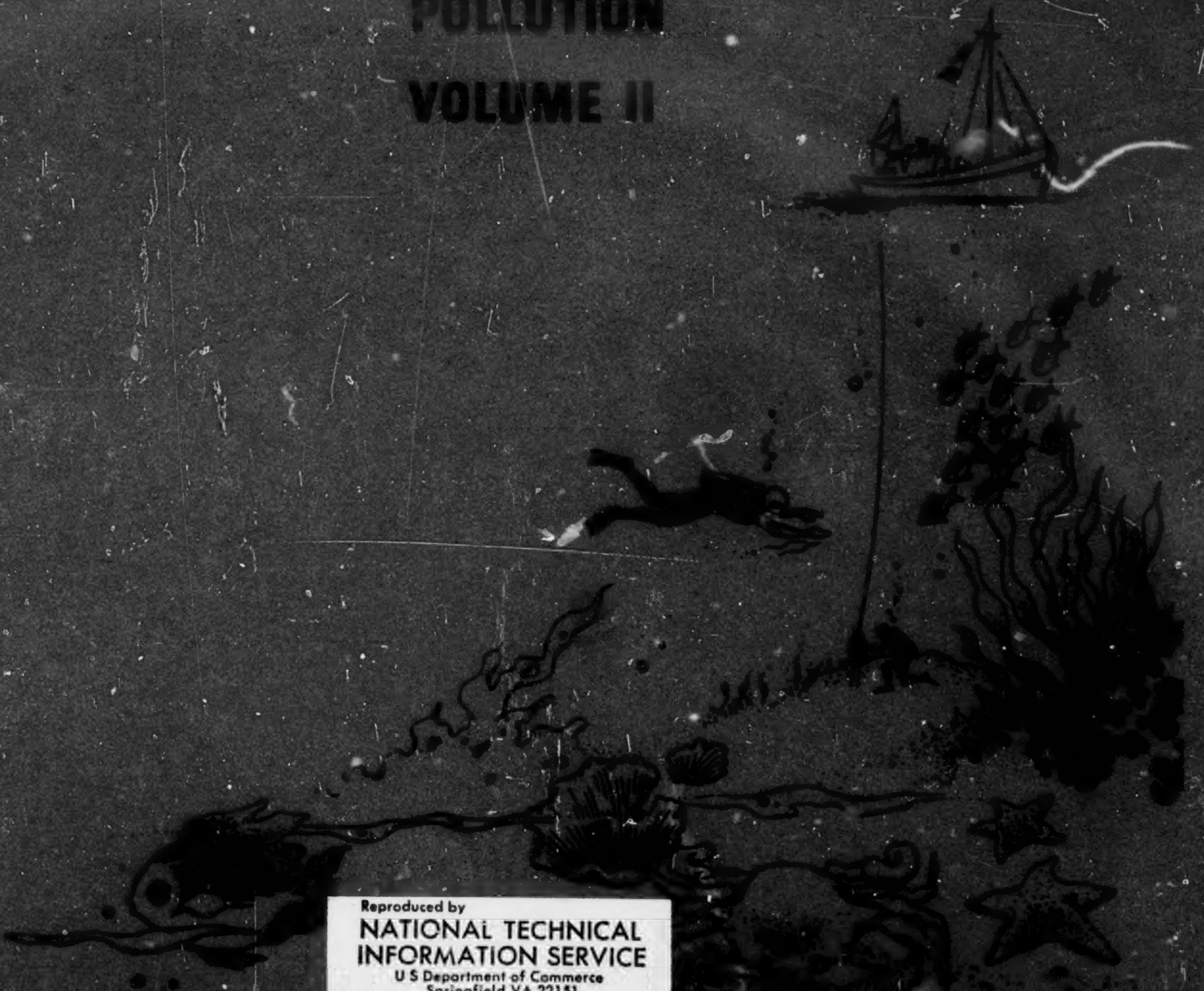
OCEANOGRAPHY OF THE NEARSHORE COASTAL WATERS OF THE PACIFIC NORTHWEST RELATING TO POSSIBLE POLLUTION

VOLUME II



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27 Abstract

This study is limited to the coastal zone of the Pacific Northwest from high tide to ten kilometers from shore, and does not include estuaries and bays. The literature has been reviewed in 21 chapters including chapters on geology, hydrology, winds, temperature and salinity, heat budget, waves, coastal currents, carbon dioxide and pH, oxygen, nutrients, and biology. Special chapters deal with field studies on thermal discharges, heat dispersion models, pulp and paper industrial wastes, trace metals, radiochemistry, pesticides and chlorine, thermal ecology, and biology of 20 selected species. A summary chapter is entitled "The nearshore coastal ecosystem: an overview." The bibliography contains more than 3100 entries, most from the open literature, but some from unpublished reports.

Vol 2 A separate volume (Vol. II) includes the following appendices: 1. Wind Data; 2. Temperature and Salinity Data; 3. Wave Data; 4. Trace Metals (including trace metal toxicities); 5. Pesticide Toxicities; 6. Oxygen, Nutrient, and pH Data; 7. Radionuclides; and 8. An Annotated Checklist of Plants and Animals (including more than 4400 species).

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TABLE OF CONTENTS

	Page
APPENDIX 1. WIND DATA	1
APPENDIX 2. TEMPERATURE AND SALINITY DATA	13
APPENDIX 3. WAVE DATA	21
APPENDIX 4. TRACE METALS	25
Aluminum	27
Antimony	29
Arsenic	30
Barium	32
Beryllium	33
Bismuth	34
Cadmium	35
Cesium	36
Chromium	38
Cobalt	39
Copper	41
Gallium	44
Germanium	45
Gold	46
Hafnium	47
Indium	48
Iron	49
Lead	51
Lithium	53
Manganese	54
Mercury	56
Molybdium	58
Nickel	59
Niobium	61
Palladium	62
Platinum	62
Polonium	63
Rhenium	63
Rhodium	64
Rubidium	65
Ruthenium	66
Scandium	67
Selenium	67
Silver	69

TABLE OF CONTENTS continued

	Page
Strontium	71
Tantalum	73
Thallium	73
Tin	74
Titanium	7
Tungsten	77
Vanadium	77
Yttrium	79
Zinc	80
Zirconium	81
Trace Metal Toxicities	83
APPENDIX 5. PESTICIDE TOXICITIES	99
Aldrin	101
DDT	101
Dieldrin	103
Endrin	104
Heptachlor	104
Lindane	105
Methoxychlor	105
Sevin	106
1-Naphthol	107
Toxaphene	108
Malathion	108
Methyl Parathion	109
Parathion	109
Phosdrin^{R}	110
APPENDIX 6. OXYGEN, NUTRIENT, AND pH DATA	111
APPENDIX 7. RADIONUCLIDES	119
Antimony	121
Beryllium	121
Carbon	122
Cerium	123
Cesium	124
Chromium	126
Cobalt	129
Hydrogen	131
Iodine	132
Iron	133
Lead	135
Manganese	136

TABLE OF CONTENTS continued

Page

Niobium
Phosphorus 138
Plutonium 141
Polonium 142
Potassium 144
Radium 145
Ruthenium 146
Rubidium 148
Silver 148
Sodium 149
Strontium 150
Thorium 152
Uranium 153
Yttrium 154
Zinc 155
Zirconium and Niobium 162
APPENDIX 8. ANNOTATED CHECKLIST OF PLANTS AND ANIMALS 165
Division CHRYSOPHYTA 175
Division PYRROPHYTA 193
ALGAE - CHLOROPHYTA 196
ALGAE - PHAEOPHYTA 217
ALGAE - RHODOPHYTA 241
Division ANGIOSPERMAE 288
Phylum Protozoa 288
Phylum Porifera 328
Phylum Coelenterata (Cnidaria) 333
Phylum Ctenophora 350
Phylum Platyhelminthes 351
Phylum Nemertea 358
Phylum Acanthocephala 362
Phylum Priapulida 362
Phylum Nematoda 362
Phylum Entoprocta 364
Phylum Ectoprocta 365
Phylum Phoronida 386
Phylum Brachiopoda 386
Phylum Sipunculoidea 387
Phylum Echiuroidea 388

TABLE OF CONTENTS continued

Page

Phylum Annelida 389
Phylum Arthropoda 440
Phylum Chaetognatha 518
Phylum Mollusca 520
Phylum Echinodermata 631
Phylum Chordata 641

APPENDIX 1. WIND DATA compiled by Robert H. Bourke

Appendix 1 is a listing of average wind conditions as observed at three lightships off the Pacific Northwest Coast. Monthly averages have been computed from observations taken every six hours. For each month during the period of record the resultant wind direction and speed, average scalar speed, and number of observations are listed. Average values for the entire period of record are also presented for each month. The data analysis was performed by the National Weather Records Center, Ashville, North Carolina.

	Page
a) Blunts Reef Lightship off Cape Mendocino, California Period of Record 1954-1966 (13 years)	3
b) Columbia River Lightship Period of Record 1953-1966 (14 years)	6
c) Umatilla Reef Lightship off Cape Alava, Washington Period of Record 1961-1965 (5 years)	10

Monthly Average Wind Conditions Observed at Blunts Reef Lightship

	Year	Resultant Direction (Degrees)	Resultant Speed (Knots)	Scalar Speed (Knots)	Number Observations
January	1954	133	3	6	124
	1955	027	1	16	124
	1956	147	18	25	124
	1957	346	2	20	124
	1958	147	12	20	123
	1959	146	7	25	123
	1960	145	12	22	124
	1961	140	9	17	124
	1962	001	11	17	124
	1963	013	8	16	124
	1964	200	2	18	124
	1965	151	6	17	124
	1966	136	5	19	123
Period of Record		131	4	16	1609
February	1954	045	4	15	111
	1955	346	10	17	112
	1956	009	3	20	116
	1957	133	7	19	112
	1958	150	22	27	112
	1959	115	2	21	112
	1960	239	0	20	116
	1961	131	3	19	112
	1962	134	8	21	112
	1963	157	8	19	112
	1964	001	14	18	116
	1965	002	8	20	112
	1966	019	2	21	110
Period of Record		091	2	19	1465
March	1954	081	2	17	124
	1955	359	10	19	124
	1956	340	5	16	124
	1957	173	6	18	118
	1958	153	3	18	124
	1959	351	9	19	124
	1960	046	2	17	124
	1961	169	7	20	124
	1962	110	2	19	124
	1963	159	1	19	124
	1964	354	9	16	109
	1965	012	7	15	124
	1966	109	4	22	124
Period of Record		023	2	18	1591
April	1954	011	8	20	96
	1955	031	2	14	112
	1956	344	11	17	120
	1957	332	8	20	119
	1958	347	7	20	120
	1959	343	15	19	120
	1960	038	3	17	116
	1961	357	11	20	120
	1962	360	14	18	120
	1963	156	5	17	120
	1964	360	19	20	120
	1965	029	5	20	120
	1966	359	12	19	120
Period of Record		357	8	18	1523

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	Year	Resultant Direction (Degrees)	Resultant Speed (Knots)	Scalar Speed (Knots)	Number Observations
May	1954	353	11	17	122
	1955	344	21	23	120
	1957	125	1	19	124
	1958	343	7	15	124
	1959	339	9	16	124
	1960	014	4	13	124
	1961	342	5	16	123
	1962	358	12	19	124
	1963	360	8	16	124
	1964	354	8	18	124
	1965	005	17	20	124
	1966	360	16	20	124
Period of Record		355	10	18	1481
June	1954	002	10	16	119
	1955	346	10	12	120
	1956	349	14	17	120
	1957	347	17	18	120
	1958	329	4	14	120
	1959	345	15	17	120
	1960	353	21	22	120
	1961	002	3	6	118
	1962	351	8	9	118
	1963	356	16	17	119
	1964	341	10	18	120
	1965	353	15	18	120
	1966	360	12	17	120
Period of Record		351	12	15	1554
July	1954	360	16	19	124
	1955	358	14	14	124
	1956	345	21	23	4
	1957	003	15	18	124
	1958	327	10	14	124
	1959	358	16	20	124
	1960	344	17	19	124
	1961	003	4	4	124
	1962	358	16	17	123
	1963	358	12	16	124
	1964	355	16	17	124
	1965	358	16	20	124
	1966	360	16	17	124
Period of Record		356	14	16	1491
August	1954	003	11	18	121
	1955	360	18	19	123
	1956	340	10	15	72
	1957	004	15	17	124
	1958	004	14	18	124
	1959	360	17	18	124
	1960	354	13	14	123
	1961	011	2	4	122
	1962	001	12	16	123
	1963	354	16	17	124
	1964	004	12	17	120
	1965	344	14	18	124
	1966	003	16	19	124
Period of Record		359	13	16	1548

	Year	Resultant Direction (Degrees)	Resultant Speed (Knots)	Scalar Speed (Knots)	Number Observations
September	1954	006	11	16	112
	1955	358	10	18	120
	1956	356	6	16	120
	1957	010	4	15	119
	1958	010	11	18	120
	1959	031	9	17	119
	1960	351	13	17	119
	1961	351	11	15	119
	1962	005	6	9	119
	1963	018	3	13	120
	1964	008	14	15	120
	1965	346	11	14	120
	1966	005	5	9	109
Period of Record		002	9	14	1536
October	1954	060	2	15	124
	1955	360	7	14	123
	1957	081	5	19	124
	1958	012	5	16	124
	1959	355	11	16	124
	1960	010	6	15	123
	1961	004	7	15	124
	1962	014	2	5	118
	1963	127	2	15	123
	1964	038	4	10	116
	1965	018	4	9	123
	1966	004	9	13	124
Period of Record		015	5	13	1470
November	1954	137	6	17	119
	1955	103	3	19	119
	1956	342	13	17	116
	1957	097	1	17	120
	1958	025	3	16	120
	1959	008	9	15	120
	1960	139	7	20	120
	1961	068	5	20	120
	1962	116	2	12	120
	1963	157	5	14	120
	1964	163	5	14	120
	1965	143	15	19	120
	1966	160	7	19	120
Period of Record		113	3	16	1554
December	1954	136	11	19	108
	1955	146	15	23	124
	1956	331	6	13	124
	1957	155	8	17	124
	1958	134	5	18	124
	1959	005	5	18	124
	1960	145	4	17	123
	1961	015	8	18	124
	1962	110	4	18	124
	1963	148	2	10	124
	1964	187	8	20	123
	1965	124	5	20	124
	1966	150	5	19	124
Period of Record		134	4	17	1594

Monthly Average Wind Conditions Observed at Columbia River Lightship

	Year	Resultant Direction (Degrees)	Resultant Speed (Knots)	Scalar Speed (Knots)	Number of Observations
January	1953	171	21	28	124
	1954	186	13	24	112
	1955	126	5	18	124
	1956	167	14	22	124
	1957	109	7	16	124
	1958	134	16	24	124
	1959	151	11	21	123
	1960	112	11	16	124
	1961	151	14	20	123
	1962	141	6	12	122
	1963	082	5	11	120
	1964	185	12	18	124
	1965	158	5	14	123
	1966	198	10	17	124
Period of Record		155	9	18	1715
February	1953	224	5	18	112
	1954	174	10	22	112
	1955	243	3	16	103
	1956	194	6	19	116
	1957	144	5	18	112
	1958	138	10	20	112
	1959	149	7	16	112
	1960	145	5	17	116
	1961	138	14	19	112
	1962	129	7	13	112
	1963	149	6	9	101
	1964	259	3	10	116
	1965	215	7	18	112
	1966	188	6	14	112
Period of Record		174	6	16	1560
March	1953	207	7	18	124
	1954	084	2	16	123
	1955	239	5	18	117
	1956	198	10	20	124
	1957	168	8	17	124
	1958	127	4	16	124
	1959	201	6	15	124
	1960	190	6	15	124
	1961	190	9	14	124
	1962	219	2	11	124
	1963	185	3	10	124
	1964	218	6	12	124
	1965	359	3	13	123
	1966	180	9	18	124
Period of Record		192	5	15	1727

	Year	Resultant Direction (Degrees)	Resultant Speed (Knots)	Scalar Speed (Knots)	Number of Observations
	1953	222	4	15	120
	1955	210	7	16	120
	1956	296	5	12	119
	1957	244	4	14	120
	1958	202	3	12	120
	1959	256	3	14	119
April	1960	194	7	12	119
	1961	249	4	11	120
	1962	220	6	10	120
	1963	192	6	11	110
	1964	263	7	14	120
	1965	216	4	15	120
	1966	293	6	14	119
Period of Record		233	4	13	1546
	1953	243	5	16	124
	1954	300	6	15	116
	1955	267	7	14	124
	1956	056	1	14	28
	1957	288	4	13	124
	1958	318	5	10	123
	1959	280	4	11	123
May	1960	202	6	11	124
	1961	222	3	10	124
	1962	265	4	8	124
	1963	270	1	7	122
	1964	267	5	13	124
	1965	279	9	14	123
	1966	317	10	15	124
Period of Record		279	4	12	1627
	1953	280	4	12	120
	1954	236	4	13	120
	1955	288	5	13	120
	1956	253	5	13	120
	1957	304	6	10	120
	1958	286	4	10	120
	1959	250	3	11	120
June	1960	323	9	11	120
	1961	302	5	12	120
	1962	333	6	10	120
	1963	296	5	7	120
	1964	273	3	10	120
	1965	303	6	9	120
	1966	255	4	11	120
Period of Record		291	4	10	1680

	Year	Resultant Direction (Degrees)	Resultant Speed (Knots)	Scalar Speed (Knots)	Number of Observations
July	1953	328	8	15	124
	1954	313	8	15	124
	1955	283	4	14	124
	1956	314	8	12	12
	1957	308	6	11	124
	1958	318	6	8	124
	1959	314	8	12	124
	1960	334	9	11	124
	1961	326	4	8	124
	1962	342	6	7	123
	1963	289	4	10	115
	1964	285	2	7	124
	1965	316	6	7	123
	1966	311	7	11	124
Period of Record		317	6	10	1613
August	1953	223	3	13	124
	1954	282	3	9	124
	1955	335	11	14	123
	1956	296	6	10	124
	1957	254	1	10	124
	1958	324	4	7	124
	1959	315	5	9	124
	1960	277	4	10	123
	1961	321	4	7	124
	1962	225	1	7	123
	1963	315	5	11	124
	1964	274	5	12	123
	1965	293	4	10	124
	1966	323	7	11	124
Period of Record		305	4	10	1732
September	1953	346	2	12	116
	1954	185	4	12	84
	1955	301	2	12	112
	1956	360	2	13	87
	1957	129	1	12	120
	1958	217	1	12	116
	1959	204	4	14	119
	1960	350	6	14	119
	1961	322	5	8	118
	1962	180	1	9	120
	1963	229	2	9	119
	1964	283	3	12	118
	1965	323	5	10	120
	1966	320	1	10	120
Period of Record		298	1	11	1588

	Year	Resultant Direction (Degrees)	Resultent Speed (Knots)	Scalar Speed (Knots)	Number of Observations
October	1953	134	3	13	118
	1955	172	7	18	124
	1956	168	6	16	80
	1957	167	3	16	80
	1958	123	4	16	124
	1959	163	3	14	120
	1960	170	6	13	124
	1961	209	2	13	124
	1962	157	5	11	124
	1963	163	9	17	124
	1964	105	5	13	122
	1965	156	7	14	124
	1966	199	3	12	124
Period of Record		159	4	14	1512
November	1953	161	5	10	120
	1955	155	8	23	120
	1956	047	5	16	72
	1957	118	5	17	120
	1958	171	7	19	120
	1959	129	4	19	119
	1960	169	7	15	120
	1961	140	6	17	120
	1962	181	12	18	120
	1963	186	11	21	120
	1964	147	4	18	116
	1965	124	9	20	120
	1966	165	7	15	120
Period of Record		157	6	17	1507
December	1953	192	4	17	124
	1954	187	13	24	45
	1955	164	11	22	92
	1956	157	10	17	123
	1957	189	10	22	109
	1958	158	12	21	124
	1959	141	7	15	124
	1960	119	9	17	124
	1961	177	8	17	124
	1962	156	9	14	124
	1963	128	9	18	124
	1964	154	6	15	124
	1965	177	9	15	124
	1966	186	14	22	123
Period of Record		163	8	17	1608

Monthly Average Wind Conditions Observed at Umatilla Lightship

	Year	Resultant Direction (Degrees)	Resultant Speed (Knots)	Scalar Speed (Knots)	Number Observations
January	1963	65	5	12	186
	1964	196	15	26	185
	1965	191	8	13	186
Period of Record		182	7	18	557
February	1962	97	7	16	168
	1963	152	11	19	168
	1964	263	6	13	172
	1965	200	6	13	167
Period of Record		167	4	16	675
March	1962	28	1	15	154
	1963	185	7	18	185
	1964	230	8	20	186
	1965	357	1	6	168
Period of Record		210	3	14	693
April	1962	188	8	16	176
	1963	181	5	15	181
	1964	260	7	15	180
	1965	197	3	15	176
Period of Record		208	5	15	713
May	1962	237	5	13	186
	1963	255	3	14	186
	1964	257	6	15	187
	1965	300	6	13	186
Period of Record		265	5	13	745
June	1962	259	6	12	180
	1963	272	6	13	180
	1964	251	5	11	179
	1965	286	4	12	180
Period of Record		266	5	12	719

	Year	Resultant Direction (Degrees)	Resultant Speed (Knots)	Scalar Speed (Knots)	Number Observations
	1961	212	3	7	114
	1962	260	5	10	186
July	1963	236	5	12	187
	1964	189	5	12	187
	1965	291	4	9	186
Period of Record		238	4	10	860
	1961	207	1	6	187
	1962	188	6	13	186
August	1963	236	3	9	186
	1964	190	2	5	186
	1965	295	1	4	180
Period of Record		206	2	7	925
	1961	199	2	7	180
	1962	170	3	12	180
September	1963	160	2	7	179
	1964	169	3	7	181
	1965	256	1	6	180
Period of Record		179	2	8	900
	1961	170	5	11	183
	1962	160	11	17	186
October	1963	156	7	10	186
	1964	173	6	13	183
	1965	177	11	17	185
Period of Record		167	8	13	923
	1961	163	8	17	180
	1962	178	11	15	180
November	1963	163	9	13	180
	1964	158	6	15	179
	1965	144	12	20	179
Period of Record		161	9	16	898
	1961	181	8	17	187
	1962	159	8	11	186
December	1963	158	12	19	186
	1964	170	6	19	185
	1965	173	13	21	186
Period of Record		168	9	17	930

APPENDIX 2. TEMPERATURE AND SALINITY DATA compiled by Robert H. Bourke

Appendix 2 is a listing of average temperatures and salinities for selected areas off the Pacific Northwest Coast. Temperature and salinity data were obtained from the National Oceanographic Data Center (NODC) and included observations through 1966. These data were primarily gathered by the University of Washington, Oregon State University, and Humboldt State College. Monthly means of temperature and salinity, maximum and minimum values, and number of observations were computed for the standard depths of 0, 10, 20, 30, and 50 meters for areas where the data were clustered.

		Page
Humblodt Bay Area		
Trinidad Head Area	January-April	15
Brookings Area	May-August	16
Coos Bay Area	September-December	17
Yaquina Head Area		
Tillamook Bay Area		
Seaside Area	January-April	18
Long Beach to Ocean Park	May-August	19
Pacific Beach Area	September-December	20
Columbia River Mouth Area		

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Depth		HUMBOLDT BAY AREA 40°49'-40°51'				TRINIDAD HEAD AREA 41°03'-41°04'				BROOKINGS AREA 42° 00'				COOS BAY AREA 43°20'-43°21'				YAQUINA HEAD AREA 44°38'-44°41'			
		Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.
January																					
0	Temp.	10.40	11.53	11.04	10									9.20	9.20	9.20	1	9.00	10.40	9.68	6
	Salinity	32.23	33.06	32.76	10									32.36	32.36	32.36	1	31.58	33.05	32.16	6
10	Temp.	10.77	11.41	11.07	8									9.72	9.72	9.72	1	8.70	10.39	9.68	6
	Salinity	32.37	33.17	32.86	9									32.70	32.70	32.70	1	31.64	32.45	32.10	6
20	Temp.	10.56	11.34	10.95	6									9.50	9.50	9.50	1	8.80	10.44	9.75	6
	Salinity	32.54	33.30	32.98	7									33.08	33.08	33.08	1	32.06	32.54	32.31	6
30	Temp.	9.91	11.08	10.73	5									9.24	9.24	9.24	1	8.64	10.48	9.60	3
	Salinity	32.72	33.44	33.09	6									33.34	33.34	33.34	1	32.52	32.62	32.56	3
50	Temp.	9.49	10.82	10.15	2									9.18	9.18	9.18	1	9.54	10.51	10.02	2
	Salinity	33.15	33.55	33.29	3									33.58	33.58	33.58	1	32.54	32.58	32.56	2
February																					
0	Temp.	11.15	11.26	11.18	3													8.62	11.22	9.45	7
	Salinity	29.88	30.57	30.16	3													30.06	32.20	31.03	7
10	Temp.	11.27	11.70	11.42	3													8.60	10.54	9.23	7
	Salinity	31.00	31.78	31.36	3													30.58	32.71	31.78	7
20	Temp.	11.27	11.52	11.39	3													8.60	10.42	9.34	7
	Salinity	32.18	32.47	32.35	3													31.44	33.321	32.41	7
30	Temp.	11.21	11.50	11.35	2													8.50	10.35	9.24	3
	Salinity	32.63	32.65	32.64	2													32.70	32.94	32.84	3
50	Temp.	11.07	11.07	11.07	1													8.35	10.19	9.09	3
	Salinity	32.79	32.79	32.79	1													32.95	33.59	33.36	3
March																					
0	Temp.	9.50	11.20	10.31	5					10.86	10.86	10.86	1	9.17	11.33	10.10	7	9.52	10.98	10.55	4
	Salinity	27.25	32.72	30.60	5									30.78	32.70	31.94	7	30.81	31.40	31.13	4
10	Temp.	9.50	11.02	10.30	5					10.70	10.70	10.70	1	8.84	10.80	9.84	7	9.20	10.89	10.40	4
	Salinity	28.64	32.86	31.75	5									32.55	32.79	32.64	7	31.26	31.94	31.55	4
20	Temp.	9.50	11.16	10.38	3					10.44	10.44	10.44	1	8.64	10.72	9.77	7	9.13	10.54	10.07	4
	Salinity	32.68	32.88	32.74	3									32.57	33.15	32.73	7	32.11	32.50	32.29	4
30	Temp.	8.99	11.15	9.96	3									8.45	10.70	9.69	7	10.12	10.12	10.12	1
	Salinity	32.77	33.28	33.09	3									32.59	33.36	32.80	6	32.56	32.56	32.56	1
50	Temp.	11.07	11.07	11.07	1									8.27	10.64	9.63	7	9.99	9.99	9.99	1
	Salinity	32.83	32.83	32.83	1									32.64	33.57	32.98	6	32.70	32.70	32.70	1
April																					
0	Temp.	8.31	10.22	9.13	6	10.93	10.93	10.93	1					11.19	11.19	11.19	1	9.26	11.64	10.51	7
	Salinity	32.81	34.14	33.73	6	32.12	32.12	32.12	1					30.93	30.93	30.93	1	29.65	32.35	31.03	7
10	Temp.	7.68	10.11	8.68	4	10.93	10.93	10.93	1					10.61	10.61	10.61	1	8.89	10.70	10.07	7
	Salinity	33.86	34.04	33.96	4	32.12	32.12	32.12	1					31.33	31.33	31.33	1	31.29	32.35	31.75	7
20	Temp.	7.16	10.12	8.27	4	10.74	10.74	10.74	1					10.17	10.17	10.17	1	8.78	10.54	9.68	7
	Salinity	33.62	34.07	33.86	4	32.29	32.29	32.29	1					31.56	31.56	31.56	1	31.56	32.92	32.17	7
30	Temp.	7.31	10.10	8.45	3	10.49	10.49	10.49	1					9.96	9.96	9.96	1	8.85	10.22	9.73	3
	Salinity	33.91	34.49	34.17	3	32.47	32.47	32.47	1					32.41	32.41	32.41	1	31.88	32.47	32.20	3
50	Temp.	7.51	7.51	7.51	1	9.84	9.84	9.84	1					8.00	8.00	8.00	1	8.16	9.60	8.87	3
	Salinity	34.03	34.03	34.03	1	32.83	32.83	32.83	1					33.64	33.64	33.64	1	32.17	33.58	32.97	3

		HUMBOLDT BAY AREA 40°49'-40°51'				TRINIDAD HEAD AREA 41°03'-41°04'				BROOKINGS AREA 42° 00'				COOS BAY AREA 43°20'-43°21'				YAQUINA HEAD AREA 44°38'-44°41'			
Depth		Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.
May																					
0	Temp.	11.12	12.50	11.72	3					10.90	12.16	11.66	5	11.71	11.71	11.71	1	9.53	12.65	10.75	6
	Salinity	31.65	31.73	31.67	3					29.40	32.32	31.57	5	32.17	32.17	32.17	1	31.26	33.00	32.05	6
10	Temp.	10.78	11.28	11.07	3					9.32	11.35	10.34	5	10.69	10.69	10.69	1	8.64	11.58	9.94	6
	Salinity	31.98	32.10	32.02	3					32.33	33.31	32.78	5	32.39	32.39	32.39	1	31.87	33.09	32.46	6
20	Temp.	9.34	10.47	9.90	2					9.02	10.25	9.65	4	10.35	10.35	10.35	1	7.71	11.09	9.20	6
	Salinity	32.86	32.88	32.87	2					32.86	33.45	33.13	4	32.59	32.59	32.59	1	32.14	33.79	32.92	6
30	Temp.	9.46	9.46	9.46	1					8.66	9.74	9.14	4	10.09	10.09	10.09	1	9.09	10.32	9.50	3
	Salinity	33.03	33.39	33.21	2					33.10	33.59	33.37	4	32.78	32.78	32.78	1	32.47	33.32	32.89	3
50	Temp.	8.22	8.22	8.22	1					8.48	8.48	8.48	1	9.30	9.30	9.30	1	7.87	8.20	8.03	2
	Salinity	33.42	33.42	33.42	1					33.68	33.68	33.68	1	33.30	33.30	33.30	1	33.51	33.60	33.55	2
June																					
0	Temp.	8.62	15.20	12.21	13	9.00	10.10	9.46	3	6.50	6.50	6.50	1	8.46	8.46	8.46	1	8.98	13.08	11.47	7
	Salinity	33.17	34.27	33.55	12	33.73	34.23	33.92	3	34.06	34.06	34.06	1	33.58	33.58	33.58	1	27.97	33.62	32.13	7
10	Temp.	8.36	13.33	10.67	10	7.21	8.57	7.89	3	6.49	6.49	6.49	1	8.29	8.29	8.29	1	7.71	11.08	9.39	6
	Salinity	33.26	34.36	33.67	9	33.77	34.22	34.04	3	34.07	34.07	34.07	1	33.62	33.62	33.62	1	31.17	33.65	32.94	7
20	Temp.	8.01	12.30	9.78	7	7.23	7.90	7.56	2	6.47	6.47	6.47	1	7.98	7.98	7.98	1	7.24	9.85	8.05	6
	Salinity	33.44	34.09	33.78	7	34.16	34.16	34.16	2	34.07	34.07	34.07	1	33.72	33.72	33.72	1	31.92	33.80	33.33	7
30	Temp.	7.66	12.06	9.57	6	7.24	7.47	7.35	2	6.47	6.47	6.47	1	7.59	7.59	7.59	1	7.13	7.95	7.55	4
	Salinity	33.45	34.13	33.82	7	34.02	34.04	34.03	2	34.07	34.07	34.07	1	33.80	33.80	33.80	1	32.46	33.93	33.54	5
50	Temp.	7.30	9.67	8.45	3	7.32	7.32	7.32	1					7.21	7.21	7.21	1	6.83	7.82	7.19	4
	Salinity	33.61	34.04	33.88	3	33.86	33.86	33.86	1					33.94	33.94	33.94	1	33.74	34.02	33.91	4
July																					
0	Temp.	11.50	14.30	12.80	3	10.40	15.10	13.66	10	11.08	11.08	11.08	1	9.47	11.96	10.59	3	7.90	14.42	9.64	11
	Salinity	33.22	33.58	33.38	3	32.90	33.69	33.35	10	33.62	33.62	33.62	1	32.89	33.40	33.22	3	30.14	33.84	33.05	11
10	Temp.	8.45	10.06	9.25	2	8.31	12.18	10.71	8	11.00	11.00	11.00	1	8.93	9.91	9.34	3	7.39	9.51	8.35	10
	Salinity	33.58	33.58	33.58	1	33.30	33.55	33.40	9	33.62	33.62	33.62	1	33.21	33.44	33.33	3	32.27	33.88	33.43	11
20	Temp.	7.95	8.68	8.31	2	9.50	10.26	9.84	5	9.23	9.23	9.23	1	8.59	8.85	8.72	2	7.10	9.56	7.89	10
	Salinity	33.66	33.66	33.66	1	33.35	33.58	33.48	6	33.79	33.79	33.79	1	33.37	33.48	33.42	3	32.37	33.96	33.62	11
30	Temp.	8.47	8.47	8.47	1	8.16	9.12	8.78	4	8.25	8.26	8.26	1	8.06	8.40	8.23	2	7.00	7.48	7.24	5
	Salinity					33.51	33.64	33.59	5	33.88	33.88	33.88	1	33.48	33.62	33.56	3	33.59	33.93	33.84	6
50	Temp.	8.07	8.07	8.07	1	8.66	8.66	8.66	2					7.89	9.49	8.69	2	6.55	7.44	7.02	4
	Salinity					33.55	33.73	33.66	3					33.66	33.83	33.77	3	33.92	33.97	33.94	4
August																					
0	Temp.	11.90	14.40	13.24	7	12.53	12.73	12.63	2	11.48	11.48	11.48	1	10.90	11.20	11.05	2	10.35	16.18	11.79	6
	Salinity	33.17	33.55	33.32	7					33.85	33.85	33.85	1	33.31	33.62	33.46	2	32.02	33.55	33.13	6
10	Temp.	10.23	12.99	11.78	6	10.47	11.00	10.73	2	10.32	10.32	10.32	1	9.48	10.95	10.21	2	8.52	16.18	10.52	6
	Salinity	33.37	33.58	33.47	6	33.04	33.04	33.04	1	33.88	33.88	33.88	1	33.48	33.64	33.56	2	32.06	33.66	33.25	6
20	Temp.	10.33	12.41	11.41	4	9.26	9.29	9.27	2	9.04	9.04	9.04	1	10.70	10.70	10.70	1	7.60	15.38	9.92	5
	Salinity	33.22	33.62	33.42	4					33.93	33.93	33.93	1	33.48	33.67	33.57	2	32.32	33.77	33.43	6
30	Temp.	9.67	10.44	9.90	4	8.76	8.99	8.87	2	8.54	8.54	8.54	1	9.61	9.61	9.61	1	7.61	9.26	8.43	2
	Salinity	33.39	33.64	33.51	4					33.94	33.94	33.94	1	33.65	33.74	33.69	2	32.54	33.86	33.36	3
50	Temp.	9.09	9.11	9.10	2	8.57	9.26	8.91	2					8.54	8.54	8.54	1	7.14	8.56	7.85	2
	Salinity	33.68	33.69	33.68	2									33.83	33.86	33.84	2	32.96	33.91	33.58	3

		HUMBOLT BAY AREA				TRINIDAD HEAD AREA				BROOKINGS AREA				COOS BAY AREA				YAQUINA HEAD AREA			
		40° 49'-40° 51'				41° 03'-41° 04'				42° 00'				43°20'-43°21'				44°38'-44°41'			
Depth		Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.
September																					
0	Temp.	11.49	14.20	12.75	7	11.70	14.40	13.32	8	12.66	12.66	12.66	1	13.20	13.28	13.24	2	9.90	15.07	12.96	5
	Salinity	33.44	33.86	33.64	7	33.39	33.75	33.56	8	33.53	33.53	33.53	1	32.94	33.10	33.02	2	32.10	33.19	32.70	5
10	Temp.	10.47	11.83	11.15	2	9.94	11.76	11.09	4	12.56	12.56	12.56	1	10.98	11.49	11.23	2	8.74	14.25	11.46	5
	Salinity	33.56	33.87	33.75	6	33.62	33.80	33.70	7	33.80	33.80	33.80	1	33.01	33.04	33.02	2	32.14	33.44	32.85	5
20	Temp.	9.73	10.31	10.02	2	9.31	10.95	10.08	3	12.06	12.06	12.06	1	9.19	10.08	9.63	2	8.04	12.30	9.27	5
	Salinity	33.71	33.39	33.79	4	33.68	33.89	33.76	5	33.91	33.91	33.91	1	33.02	33.13	33.07	2	32.57	33.68	33.15	5
30	Temp.	9.34	9.87	9.60	2	9.15	9.16	9.15	2	10.77	10.77	10.77	1	8.64	9.20	8.92	2	7.55	8.45	7.92	3
	Salinity	33.77	33.87	33.82	4	33.66	33.87	33.77	4	33.77	33.77	33.77	1	33.24	33.27	33.25	2	33.44	33.82	33.63	3
50	Temp.	9.56	9.56	9.56	1	8.74	8.74	8.74	1					8.68	8.94	8.81	2	7.23	7.33	7.28	2
	Salinity	33.75	34.02	33.88	2	33.81	33.91	33.86	2					33.65	33.78	33.71	2	33.86	33.89	33.87	2
October																					
0	Temp.	11.32	11.79	11.49	6	12.42	12.42	12.42	1	11.05	11.05	11.05	1	11.46	15.06	13.46	3	10.45	14.34	12.15	10
	Salinity	33.22	33.42	33.32	6	33.35	33.35	33.35	1	33.00	33.00	33.00	1	32.45	33.12	32.83	3	32.04	33.04	32.53	10
10	Temp.	11.19	12.04	11.42	6	12.44	12.44	12.44	1	10.79	10.79	10.79	1	11.40	14.99	13.44	3	9.08	14.16	11.67	10
	Salinity	33.06	33.39	33.29	6	33.35	33.35	33.35	1	33.25	33.25	33.25	1	32.47	33.12	32.84	3	32.05	33.14	32.58	10
20	Temp.	10.57	11.08	10.80	4	11.66	11.66	11.66	1	10.57	10.57	10.57	1	11.21	14.31	13.10	3	8.57	13.88	11.15	10
	Salinity	33.40	33.44	33.41	4	33.43	33.43	33.43	1	33.32	33.32	33.32	1	32.70	33.17	32.94	3	32.24	33.50	32.73	10
30	Temp.	10.28	10.70	10.44	4	10.87	10.87	10.87	1	10.52	10.52	10.52	1	10.39	13.35	11.95	3	10.44	12.71	11.25	4
	Salinity	33.40	33.48	33.44	4	33.52	33.52	33.52	1	33.34	33.34	33.34	1	32.98	33.30	33.12	3	32.46	33.33	32.82	4
50	Temp.	9.90	9.90	9.90	1	9.97	9.97	9.97	1					9.28	10.14	9.71	2	8.58	9.57	9.07	2
	Salinity	33.41	33.41	33.41	1	33.63	33.63	33.63	1					33.50	33.71	33.60	2	33.26	33.53	33.39	2
November																					
0	Temp.													10.40	11.19	10.79	2	10.52	13.21	11.94	9
	Salinity													32.62	32.75	32.68	2	30.35	32.62	32.14	10
10	Temp.													10.19	10.92	10.55	2	10.51	13.19	11.96	10
	Salinity													32.68	32.84	32.76	2	31.99	32.69	32.35	10
20	Temp.													9.56	10.40	9.98	2	10.48	13.20	11.94	10
	Salinity													32.99	33.19	33.09	2	32.29	32.79	32.43	10
30	Temp.													9.20	9.89	9.54	2	10.61	13.20	11.83	5
	Salinity													33.23	33.40	33.31	2	32.38	32.71	32.53	5
50	Temp.													9.46	9.46	9.46	1	9.97	13.15	11.32	3
	Salinity													33.41	33.41	33.41	1	32.59	32.90	32.73	3
December																					
0	Temp.	10.39	11.85	11.34	7					9.71	9.71	9.71	1	9.79	11.14	10.44	3	8.90	11.60	10.41	7
	Salinity	23.10	33.17	30.67	8					32.72	32.72	32.72	1	30.25	32.45	31.67	3	29.44	32.54	31.66	7
10	Temp.	11.13	11.75	11.45	6					9.85	9.85	9.85	1	9.86	11.75	10.92	3	9.39	11.59	10.50	7
	Salinity	29.69	33.21	32.25	8					33.26	33.26	33.26	1	32.32	32.62	32.45	3	27.71	32.52	31.46	7
20	Temp.	11.21	11.76	11.48	4					9.94	9.94	9.94	1	9.98	11.59	10.91	3	9.48	11.60	10.76	7
	Salinity	32.54	33.19	33.01	5					33.42	33.42	33.42	1	32.42	32.70	32.57	3	31.72	32.52	32.24	7
30	Temp.	11.31	11.67	11.45	4					10.15	10.15	10.15	1	10.07	11.58	10.98	3	9.48	11.73	10.68	5
	Salinity	32.70	33.17	33.05	5					33.51	33.51	33.51	1	32.65	32.86	32.74	3	32.44	32.72	32.53	5
50	Temp.	10.85	11.31	11.08	2									9.63	11.54	10.58	2	9.50	11.73	10.72	4
	Salinity	33.28	33.30	33.29	2									32.68	33.38	33.03	2	32.53	32.94	32.70	4

		TILLAMOOK BAY AREA 45°30'-45°46'				SEASIDE AREA 45°58'-46°05'				LONG BEACH TO OCEAN PARK 46°22'-46°36'				PACIFIC BEACH AREA 47°00'-47°19'				COLUMBIA RIVER MOUTH AREA 46°07'-46°22'			
Depth		Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.
January																					
0	Temp.	10.26	10.26	10.26	1					7.31	9.62	8.17	3	9.28	9.28	9.28	1	8.10	9.50	8.92	5
	Salinity	32.00	32.00	32.00	1					27.57	28.27	27.92	3	28.26	28.26	28.26	1	24.18	30.68	27.74	5
10	Temp.	10.29	10.29	10.29	1					7.55	9.92	8.36	3	9.65	9.65	9.65	1	8.82	10.04	9.32	5
	Salinity	32.03	32.03	32.03	1					28.63	30.11	29.32	3	29.56	29.56	29.56	1	29.52	31.68	30.44	5
20	Temp.	10.37	10.37	10.37	1					7.67	10.09	8.62	3	9.87	9.87	9.87	1	8.87	10.26	9.51	5
	Salinity	32.16	32.16	32.16	1					29.79	30.95	30.50	3	30.41	30.41	30.41	1	30.83	32.36	31.53	5
30	Temp.									10.17	10.17	10.17	1					8.97	10.44	9.63	5
	Salinity									31.18	31.18	31.18	1					31.26	32.45	31.96	5
50	Temp.																	9.13	9.27	9.20	2
	Salinity																	32.08	32.72	32.40	2
February																					
0	Temp.	8.16	8.16	8.16	1	7.41	8.50	8.01	3	7.31	8.37	8.00	6	7.85	8.64	8.24	2	6.47	10.03	7.61	37
	Salinity	27.41	27.41	27.41	1	19.16	28.82	24.76	3	21.08	28.72	26.29	6	25.20	30.14	27.67	2	8.12	29.41	20.15	37
10	Temp.	8.64	8.64	8.64	1	8.27	8.52	8.42	3	7.95	8.55	8.27	6	8.08	9.07	8.57	2	7.68	10.67	8.36	37
	Salinity	31.94	31.94	31.94	1	27.17	29.85	28.92	3	28.77	30.89	29.52	6	30.97	31.18	31.07	2	22.93	31.21	28.28	37
20	Temp.	9.11	9.11	9.11	1	8.47	8.82	8.67	3	8.25	9.11	8.68	6	8.68	9.92	9.30	2	8.25	10.49	8.79	30
	Salinity	32.39	32.39	32.39	1	29.90	31.69	31.02	3	30.45	32.02	31.42	6	32.36	32.51	32.43	2	28.85	32.08	30.95	30
30	Temp.	9.26	9.26	9.26	1					8.42	9.11	8.87	3	9.80	9.80	9.80	1	8.94	10.38	9.35	5
	Salinity	32.54	32.54	32.54	1					31.65	32.12	31.87	3	32.70	32.70	32.70	1	31.74	32.64	32.29	5
50	Temp.	8.77	8.77	8.77	1													9.75	9.75	9.75	1
	Salinity	33.15	33.15	33.15	1													32.84	32.84	32.84	1
March																					
0	Temp.	10.29	10.29	10.29	1	8.91	10.30	9.33	5	8.20	9.79	8.84	8	9.02	9.68	9.25	3	8.17	11.90	8.94	28
	Salinity	31.08	31.08	31.08	1	24.76	30.89	27.74	5	20.55	30.42	27.37	8	25.95	28.76	27.23	3	14.75	30.74	24.29	27
10	Temp.	10.29	10.29	10.29	1	8.13	10.20	8.76	5	7.77	10.00	8.74	8	8.68	9.82	9.42	3	7.99	10.66	8.86	28
	Salinity	31.08	31.08	31.08	1	29.35	31.50	30.64	5	26.08	31.70	30.66	8	28.29	31.55	30.07	3	28.35	32.09	30.77	28
20	Temp.	10.28	10.28	10.28	1	8.16	10.20	8.65	5	7.89	10.06	8.69	6	8.68	9.94	9.35	3	7.82	10.34	8.82	20
	Salinity	31.08	31.08	31.08	1	31.23	32.31	31.63	5	31.58	32.74	32.16	6	31.52	32.13	31.80	3	30.11	33.05	32.10	20
30	Temp.	10.22	10.22	10.22	1	7.93	10.23	8.57	5	8.05	9.63	8.60	3	8.68	9.94	9.39	3	7.95	10.34	8.77	15
	Salinity	31.47	31.47	31.47	1	31.78	32.72	32.28	5	32.18	33.02	32.55	3	31.66	32.47	32.04	3	31.41	33.32	32.66	15
50	Temp.					8.23	10.20	9.21	2												
	Salinity					32.23	33.07	32.65	2												
April																					
0	Temp.	9.42	9.42	9.42	1	9.15	9.34	9.24	2	8.37	11.05	9.17	6	9.49	9.49	9.49	1	8.31	11.47	9.66	11
	Salinity	25.84	25.84	25.84	1	27.06	27.66	27.36	2	17.85	31.36	27.39	6	25.65	25.65	25.65	1	16.43	29.30	22.08	11
10	Temp.	8.66	8.66	8.66	1	8.87	9.36	9.11	2	8.30	11.09	9.04	6	9.20	9.20	9.20	1	8.16	10.68	9.27	11
	Salinity	29.91	29.91	29.91	1	29.79	31.28	30.53	2	24.99	31.50	29.82	6	29.39	29.39	29.39	1	27.53	31.87	30.04	11
20	Temp.	8.36	8.36	8.36	1	8.11	9.20	8.65	2	8.13	8.67	8.37	4	8.44	8.44	8.44	1	8.13	10.16	9.18	10
	Salinity	31.71	31.71	31.71	1	31.21	32.26	31.73	2	31.27	31.62	31.50	4	31.39	31.39	31.39	1	29.99	33.00	31.67	10
30	Temp.	8.05	8.05	8.05	1	8.03	8.71	8.37	2	8.04	8.59	8.27	3					7.94	9.96	8.89	7
	Salinity	32.40	32.40	32.40	1	32.17	33.02	32.59	2	32.24	32.83	32.58	3					31.00	33.45	32.57	7
50	Temp.	8.13	8.13	8.13	1	7.98	7.98	7.98	1									9.81	9.81	9.81	1
	Salinity	33.02	33.02	33.02	1	33.61	33.61	33.61	1									31.98	31.98	31.98	1

Depth		TILLAMOOK BAY AREA 45°30'-45°46'				SEASIDE AREA 45°58'-46°05'				LONG BEACH TO OCEAN PARK 46°22'-46°36'				PACIFIC BEACH AREA 47°00'-47°19'				COLUMBIA RIVER MOUTH AREA 46°07'-46°22'			
		Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.
May																					
0	Temp.	12.20	14.13	13.24	4	12.05	12.05	12.05	1	12.35	13.37	12.97	3					8.95	14.28	12.01	10
	Salinity	29.00	30.90	30.18	3	30.31	30.31	30.31	1	29.48	31.11	30.24	3					14.41	27.38	21.65	9
10	Temp.	9.98	11.75	10.99	4	11.70	11.70	11.70	1	10.23	11.93	11.11	3					8.60	12.66	10.49	10
	Salinity	31.43	31.97	31.72	3	31.26	31.26	31.26	1	30.66	31.82	31.36	3					29.38	32.02	31.16	10
20	Temp.	9.60	10.88	10.12	4	10.99	10.99	10.99	1	9.36	10.57	9.96	2					8.21	10.76	9.56	9
	Salinity	32.02	32.27	32.11	3	31.96	31.96	31.96	1	31.52	32.21	31.86	2					31.41	33.11	32.19	9
30	Temp.	9.75	10.77	10.26	2	10.32	10.32	10.32	1	8.98	9.84	9.41	2					7.74	9.69	8.72	4
	Salinity	32.16	32.31	32.23	2	32.20	32.20	32.20	1	32.35	32.90	32.62	2					32.50	33.62	32.82	4
50	Temp.	8.70	8.81	8.75	2	8.82	8.82	8.82	1									7.32	8.98	8.31	3
	Salinity	32.44	33.25	32.84	2	33.03	33.03	33.03	1									32.97	33.81	33.36	3
June																					
0	Temp.	8.98	14.22	12.00	6	10.87	13.84	12.71	11	11.38	16.26	13.49	15	13.10	14.42	13.99	4	9.29	15.96	13.62	110
	Salinity	25.48	33.03	30.05	6	17.68	31.75	24.71	11	10.87	32.01	21.86	15	25.59	30.60	27.19	4	.62	31.84	16.57	117
10	Temp.	8.93	11.38	10.09	6	8.12	11.61	9.80	11	8.46	13.61	11.30	15	8.78	12.44	10.52	4	7.57	13.63	10.44	106
	Salinity	31.63	33.05	32.09	6	31.42	32.51	32.11	11	24.83	33.01	30.22	15	31.19	32.62	31.84	4	2.92	33.57	30.84	117
20	Temp.	7.69	8.89	8.18	6	7.41	9.11	7.91	11	7.56	10.77	8.67	13	7.96	8.42	8.24	3	7.33	13.37	8.25	75
	Salinity	32.62	33.31	32.91	6	32.44	33.42	32.95	11	31.78	33.66	32.77	13	32.76	33.28	32.94	3	28.17	33.74	32.84	81
30	Temp.	7.53	8.49	8.00	4	7.48	8.10	7.66	11	7.29	8.46	7.74	7	7.67	7.93	7.80	2	7.31	11.28	7.69	67
	Salinity	33.14	33.56	33.38	4	32.79	33.73	33.43	11	32.76	33.77	33.38	7	33.29	33.61	33.45	2	31.57	33.81	33.46	68
50	Temp.	7.42	7.95	7.68	2	7.01	7.23	7.12	2	7.58	7.58	7.58	1					6.95	7.42	7.23	34
	Salinity	33.68	33.79	33.73	2	33.82	33.92	33.87	2	33.72	33.72	33.72	1					33.77	33.95	33.86	34
July																					
0	Temp.	8.44	8.44	8.44	1	15.08	15.08	15.08	1					10.30	10.30	10.30	1	13.20	16.16	14.68	2
	Salinity	33.16	33.16	33.16	1	29.05	29.05	29.05	1	21.64	21.64	21.64	1	33.43	33.43	33.43	1	22.32	28.48	25.40	2
10	Temp.	8.69	8.69	8.69	1	13.76	13.76	13.76	1					9.98	9.98	9.98	1	10.09	11.88	10.98	2
	Salinity	33.48	33.48	33.48	1	30.16	30.16	30.16	1	28.69	28.69	28.69	1	33.39	33.39	33.39	1	31.18	32.83	32.00	2
20	Temp.	8.36	8.36	8.36	1	9.70	9.70	9.70	1					7.99	7.99	7.99	1	7.64	8.15	7.89	2
	Salinity	33.53	33.53	33.53	1	32.91	32.91	32.91	1					33.56	33.56	33.56	1	33.30	33.61	33.45	2
30	Temp.					8.50	8.50	8.50	1									6.82	7.80	7.31	2
	Salinity					33.22	33.22	33.22	1									33.56	33.91	33.73	2
50	Temp.																	6.40	6.40	6.40	1
	Salinity																	33.97	33.97	33.97	1
August																					
0	Temp.	10.45	15.07	12.76	2	14.13	15.26	14.55	3	11.56	14.69	13.58	4					10.39	18.19	14.40	51
	Salinity	30.88	32.65	31.76	2	26.85	29.87	28.80	3	28.27	32.45	30.70	4					12.02	31.55	25.21	51
10	Temp.	8.98	11.13	10.05	2	10.00	11.23	10.63	3	10.34	12.62	11.44	4					7.65	15.72	11.64	47
	Salinity	32.32	32.98	32.65	2	32.07	32.53	32.35	3	32.27	32.66	32.47	4					23.31	33.67	31.41	48
20	Temp.	7.82	8.74	8.28	2	8.04	8.19	8.14	3	8.16	9.82	8.99	2					7.54	13.37	8.81	33
	Salinity	32.71	33.49	33.10	2	32.94	33.08	33.02	3	32.96	33.00	32.98	2					30.21	33.84	33.03	34
30	Temp.	7.58	8.08	7.83	2	7.62	7.77	7.67	3	7.50	8.66	8.08	2					7.25	9.07	7.64	26
	Salinity	32.95	33.66	33.30	2	33.26	33.41	33.33	3	33.16	33.49	33.32	2					32.88	33.89	33.59	27
50	Temp.	7.71	7.71	7.71	1	7.45	7.59	7.53	3	7.46	7.46	7.46	1					7.19	7.62	7.46	12
	Salinity	33.41	33.41	33.41	1	33.71	33.87	33.78	3	33.83	33.83	33.83	1					33.77	33.90	33.84	12

Depth		TILLAMOOK BAY AREA 45°30'-45°46'				SEASIDE AREA 45°58'-46°05'				LONG BEACH TO OCEAN PARK 46°22'-46°36'				PACIFIC BEACH AREA 47°00'-47°19'				COLUMBIA RIVER MOUTH AREA 46°07'-46°22'			
		Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.	Min.	Max.	Mean	Obs.
September																					
0	Temp.	12.20	15.57	14.18	4	12.83	17.20	14.85	7	12.59	15.53	13.90	9	13.58	16.08	15.00	3	10.64	17.24	13.84	155
	Salinity	31.09	32.39	31.87	4	26.28	28.54	27.35	7	26.96	32.04	29.80	9	30.39	31.98	30.97	3	20.45	32.03	27.80	156
10	Temp.	11.70	14.30	12.62	4	9.11	15.30	12.47	7	8.98	15.32	12.40	9	11.55	13.23	12.54	3	7.74	15.62	11.48	155
	Salinity	32.32	32.66	32.45	4	31.36	32.75	32.12	7	31.18	32.93	32.12	9	31.85	32.35	32.06	3	27.95	33.27	31.74	156
20	Temp.	8.32	12.31	9.89	4	7.84	11.16	8.90	7	7.87	10.58	8.93	5	8.54	10.88	9.68	3	7.53	14.89	8.43	146
	Salinity	32.89	33.04	32.96	4	32.37	33.27	32.90	7	32.49	33.22	32.85	6	32.51	33.30	32.97	3	31.10	33.57	33.07	147
30	Temp.	8.66	11.23	9.94	2	7.71	9.91	8.27	6	7.72	7.85	7.77	3					7.53	8.86	7.74	102
	Salinity	33.04	33.12	33.08	2	32.69	33.40	33.18	6	33.21	33.46	33.35	3					32.76	33.83	33.46	102
50	Temp.	7.78	9.21	8.49	2	7.52	7.86	7.73	4									7.40	8.00	7.67	10
	Salinity	33.37	33.55	33.46	2	33.40	33.64	33.55	4									33.51	33.84	33.65	10
October																					
0	Temp.	15.24	15.40	15.33	3	15.69	16.24	15.88	4	11.80	16.35	14.90	5	14.70	14.70	14.70	1	12.84	16.08	14.24	10
	Salinity	31.76	31.92	31.81	3	30.73	31.78	31.37	4	27.08	31.81	29.37	5	30.09	30.09	30.09	1	21.64	32.40	28.08	10
10	Temp.	14.68	15.32	14.90	3	12.03	15.68	13.81	4	14.83	15.28	15.09	4	15.04	15.04	15.04	1	11.13	15.55	13.78	10
	Salinity	31.93	32.16	32.07	3	31.46	32.50	32.10	4	31.40	31.83	31.58	4	31.05	31.05	31.05	1	31.26	32.87	31.95	10
20	Temp.	13.70	13.89	13.77	3	9.52	13.90	11.76	4	10.53	15.32	12.94	4	15.05	15.05	15.05	1	9.84	15.43	13.20	10
	Salinity	32.41	32.44	32.42	3	31.91	32.88	32.56	4	31.56	33.00	32.34	4	31.24	31.24	31.24	1	31.60	33.12	32.17	10
30	Temp.	11.46	12.93	12.37	3	8.54	11.85	10.05	4	9.75	15.24	12.49	2	15.09	15.09	15.09	1	8.67	15.31	12.46	10
	Salinity	32.58	32.93	32.70	3	32.76	33.21	32.98	4	31.96	33.12	32.54	2	31.37	31.37	31.37	1	31.84	33.31	32.45	10
50	Temp.	9.31	9.88	9.59	2	8.35	9.28	8.70	3	8.46	15.18	11.82	2					8.34	14.83	11.21	7
	Salinity	33.14	33.30	33.22	2	33.06	33.54	33.35	3	31.95	33.41	32.68	2					31.92	33.52	32.75	7
November																					
0	Temp.					10.41	10.41	10.41	1	10.02	10.88	10.59	5					9.88	10.52	10.25	9
	Salinity					32.16	32.16	32.16	1	29.48	32.21	30.64	5					24.14	32.31	29.20	9
10	Temp.					10.39	10.39	10.39	1	10.00	10.91	10.59	5					9.99	10.87	10.43	8
	Salinity					32.18	32.18	32.18	1	29.70	32.21	30.89	5					29.66	32.32	31.65	8
20	Temp.					10.43	10.43	10.43	1	10.11	11.66	10.82	5					10.32	11.07	10.52	7
	Salinity					32.21	32.21	32.21	1	31.11	32.22	31.62	5					30.62	32.45	32.08	7
30	Temp.					10.42	10.42	10.42	1	10.73	12.08	11.50	3					9.82	11.18	10.51	7
	Salinity					32.21	32.21	32.21	1	32.11	32.27	32.17	3					32.21	32.92	32.46	7
50	Temp.																	7.73	10.63	9.64	3
	Salinity																	32.37	33.77	32.88	3
December																					
0	Temp.	11.40	12.02	11.71	2					7.36	10.33	8.84	2	6.92	6.92	6.92	1	6.86	10.97	9.84	5
	Salinity	31.02	32.05	31.53	2					24.54	27.66	26.10	2	26.98	26.98	26.98	1	21.70	29.28	25.85	6
10	Temp.	11.41	12.04	11.72	2					8.56	10.87	9.71	2	6.98	6.98	6.98	1	7.80	12.28	10.76	5
	Salinity	31.02	32.05	31.53	2					29.05	30.10	29.57	2	27.87	27.87	27.87	1	28.05	31.54	29.58	6
20	Temp.	11.73	12.04	11.88	2					8.86	12.23	10.54	2	8.60	8.60	8.60	1	9.32	12.47	11.46	5
	Salinity	31.47	32.05	31.76	2					31.61	31.75	31.68	2	31.04	31.04	31.04	1	31.29	32.52	31.91	6
30	Temp.	12.51	12.51	12.51	1					9.44	9.44	9.44	1	9.34	9.34	9.34	1	9.55	12.29	11.49	5
	Salinity	32.20	32.20	32.20	1					32.21	32.21	32.21	1	32.30	32.30	32.30	1	32.20	32.68	32.47	5
50	Temp.																	9.56	12.41	11.25	4
	Salinity																	32.47	32.90	32.65	4

APPENDIX 3. WAVE DATA compiled by Robert H. Bourke

Wave statistics as compiled by Neal, et al. (1160) from observations off Newport, Oregon are presented in Appendix 3. Weekly observations of breaker height and period during 1968-1969 were made from the beach using the height of eye technique. The deep water wave height, H_0, was inferred from the breaker height using solitary wave theory. The non-refracted wave direction was determined from aerial observations while over "deep" water.

WAVE STATISTICS FOR NEWPORT, OREGON

Date	Wave Direction (from)	T_f	H_b	H_o
9-17-68	235°	13.0	11.3	7.8
9-18	280	11.0	6.6	4.1
9-27	300	10.0	10.0	8.5
10-3	295	9.2	5.6	3.9
10-4	290	9.1	9.1	8.1
10-10	280	9.6	11.3	10.6
10-23	280	9.5	9.3	8.0
10-28	250	10.3	9.6	7.8
10-31	265	10.7	8.7	6.4
11-5	260	12.0	11.3	8.5
11-7	230	11.2	11.0	8.8
11-12	170	13.3	10.0	6.4
11-14	285	12.4	9.3	6.2
11-19	270	12.5	8.0	4.9
11-26	285	12.8	8.0	4.8
11-29	270	13.6	13.0	9.3
12-5	297	13.0	15.3	12.4
12-12	270	11.9	13.0	10.6
12-17	290	9.0	9.3	8.5
12-24	255	14.7	15.0	10.6
12-26	270	9.2	10.4	9.8
1-2-69	270	8.7	13.3	---
1-9	280	11.8	16.0	14.6
1-14	280	12.7	11.7	8.5
1-16	290	9.1	9.0	8.0
1-21	270	9.2	8.6	7.4
1-23	290	11.8	9.3	6.5

Date	Wave Direction (from)	T_s	H_b	H_o
2-4	280/230	10.3	7.8	5.7
2-6	260/210		10.7	
2-11	240	17.8	10.0	4.8
2-13	290	14.2	13.3	9.2
2-18	280	13.7	14.7	11.1
2-20	282	15.5	16.1	11.2
2-25	290	11.8	10.7	8.0
2-27	245	10.7	14.6	----
3-4	280	10.7	11.1	9.3
3-6	295	13.5	16.0	12.8
3-11	290	14.4	8.0	4.2
3-13	280	9.8	9.3	7.8
3-18	265	13.5	11.3	7.6
4-1	270	11.4	12.3	10.2
4-3	280	11.3	14.0	12.5
4-7	295	10.9	8.6	6.2
4-8	287	14.7	10.5	6.2
4-10	280	10.6	12.0	10.5
4-22	255	11.4	9.3	6.7
4-24	290	10.6	8.7	6.5
4-29	305	9.4	9.3	8.1
5-1	285	14.5	14.7	10.4
5-5	292	12.1	8.7	5.7
5-8	290	11.6	6.0	3.4
5-13	315	12.9	9.3	5.9
5-16	315	9.6	9.3	7.9
5-21	285	12.0	5.3	2.7
5-27	260	8.6	14.6	----

Date	Wave Direction (from)	T_s	H_b	H_o
6-3	270	7.6	5.3	4.3
6-5	315	9.8	6.7	4.6
6-10	275	11.6	9.3	6.6
6-13	320	9.3	5.3	3.5
6-14	270	11.7	4.0	1.8
6-18	260	7.1	7.0	----
6-19	320	7.8	4.0	2.8
6-25	280	11.6	8.7	5.9
6-30	335	7.0	8.7	----
7-1	340	6.4	7.3	----
7-7	320	5.8	9.0	
7-8	310	5.7	5.4	----
7-14	300	11.3	4.7	2.4
7-16	315	7.8	7.2	6.8
7-18	320	8.1	4.3	3.0
7-21	350	5.2	9.3	----
7-28	315	11.4	5.3	2.9
7-29	330	6.6	4.4	3.8
8-1	335	7.2	4.4	3.4
8-11	320	9.0	4.4	2.8
8-18	320	6.3	8.7	7.4
8-19	325	6.1	8.7	----

(from Neal, et al. 1160)

APPENDIX 4. TRACE METALS

by Stephen W. Hager

Data on Trace Metal Distributions and Behavior in the Nearshore Marine Environment

Information on the physico-chemical form, observed distributions in sea water, biological involvement, relevant geological processes, industrial uses, and analytical difficulties associated with 54 trace metals was collected. Sources of information were the published literature, unpublished university theses, and Chemical Abstracts. Some good compilations of sea water concentrations of trace metals already existed (6168), but original sources were consulted where possible in an attempt to uncover specific information about nearshore values and behavior.

The following considerations were followed:

Physico-chemical form: An attempt was made to disregard early speculation in favor of later information (but not later speculation).

Observed distributions: If four or more references were available from the Pacific Ocean, only these are presented and others are simply referenced. All distributions are presented for those elements with less than four Pacific Ocean studies.

Biological considerations: Quantitative information, when available, was included.

Geochemical considerations: Any information encountered which was related to river influxes, sedimentation, and general geochemical processes is included.

Industrial sources: General information on the primary industrial uses, whether relevant to this area or not, is presented.

Analytical considerations: This section contains primarily information relating to sample collection and storage. Concentration, separation, and instrumental difficulties were not considered.

The information is presented by element, and the elements are presented in alphabetical order.

Preceding page blank

Aluminum	27
Antimony	29
Arsenic	30
Barium	32
Beryllium	33
Bismuth	34
Cadmium	35
Cesium	36
Chromium	38
Cobalt	39
Copper	41
Gallium	44
Germanium	45
Gold	46
Hafnium	47
Indium	48
Iron	49
Lead	51
Lithium	53
Manganese	54
Mercury	56
Molybdium	58
Nickel	59
Niobium	61
Palladium	62
Platinum	62
Polonium	63
Rhenium	63
Rhodium	64
Rubidium	65
Ruthenium	66
Scandium	67
Selenium	67
Silver	69
Strontium	71
Tantalum	73
Thallium	73
Tin	74
Titanium	76
Tungsten	77
Vanadium	77
Yttrium	79
Zinc	80
Zirconium	81
Trace Metal Toxicities	83

ALUMINUM

Physico-chemical form:

Various hydrolysates of Al (III) (6179) are strongly adsorbed on particulate matter. Physical form is often arbitrarily designated: dissolved (<0.45μ and reactive), fine disperse (< 0.45μ released by oxidation) and coarse particulate (> 0.45μ) (6139). Aluminate ions probably present at the pH of seawater (6075). Some Al may also be present in organic complexes (6064).

Observed distributions:

Puget Sound and the Pacific: Sackett and Arrhenius measured dissolved (<0.45μ) aluminum: 2 ±1 μg/l for 11 surface samples taken off the Scripps pier over a six-month period, 1 ± 1 μg/l for nine samples taken between 3,500 and 4,100 m in the Pacific, 1 ± 1 μg/l for 97 samples taken between 0 and 600 meters in the Pacific, and 5 to 7 ± 2 μg/l for 4 Puget Sound samples with salinities of 32‰ (6139).

San Juan Channel and off the Washington and British Columbia coasts: Haendler and Thompson showed a seasonal variation in dissolved aluminum with a May maximum of 430 μg/l and an October to December minimum of 220 μg/l. Values increased with depth to about 1,000 m at two offshore locations (6064). These values were thought to be high due to the filtering procedure employed (6181).

Northeast Pacific: Joyner found from 0.5 to 41 μg particulate Al/l, with the higher values near the coast and particularly in runoff waters (6094).

Other studies giving a range of values from 0-1200 μg/l dissolved aluminum are 6191, 6082, 6190, 6068, 6096, 6202, and 6146.

Biological considerations:

Organisms concentrate Al slightly relative to seawater (6075). Marine plants have 60 ppm while plankton and calcareous red algae have even higher Al contents. Marine animals have 10-50 ppm Al, with higher values in siliceous sponges (6019). However, some organisms may get their Al from bottom muds, not seawater (6043).

ALUMINUM continued

Haendler and Thompson (6064) claimed "indication of maximum aluminum at 900 to 1,000 meters" in the Pacific.

Geochemical considerations:

Definite effects on Al concentration from land drainage (6139). Haendler and Thompson (6064) showed a correlation between high Al values and high river flow into Puget Sound. Kopp and Kroner (6251) found an average of 15 µg/l dissolved (< 0.45µ) aluminum in the Columbia at Clatskanie, Oregon. Durum and Haffty found 160 µg/l in filtered samples (6208).

Industrial sources:

Aluminum wastes are produced by the following industries: dyeing and cloth printing, manufacturing parchment and other papers, oil refining, disinfection, manufacture of incandescent filaments, tanning and finishing of leather, canning, and explosives manufacturing (6000).

Analytical considerations:

Samples should be filtered soon after collection. Can be stored, frozen, in polyethylene for some time (6139). Al may be leached from glassware, hence, polyethylene containers are recommended (6139). Al also leached from fine disperse fraction, up to 9 µg/l depending on oxidizing conditions of analysis (6139).

Conclusions:

The following table, constructed from the data of Sackett and Arrhenius (6139) gives an estimate of expected aluminum distributions:

	Dissolved µg/l	Dissolved and total <0.45 µ µg/l	Particulate µg/l
Open ocean	1 ± 1	< 10	1-120
Coastal	→ 10	?	→ 10,000

Marine organisms probably utilize all forms of Al, but the forms which may be toxic are not known.

ANTIMONY

Physico-chemical form:

Sb^{++} ion has some definite cationic chemistry. Tendency to hydrolyze may produce SbO^+ ion (6179). Mainly ionic (6061), but this may not be an equilibrium observation.

Observed distributions:

All Oceans: Schutz and Turekian found values from 0.21 to 0.51 µg/l with an average of 0.33 µg/l (6141).

Irish Sea: Portmann and Riley found values from 0.13 to 0.40 µg/l with an average of 0.24 µg/l (6129).

Gullmarsfjord: Noddack and Noddack found less than 0.5 µg/l (6121).

Biological considerations:

Sb is concentrated by "certain forms of marine life" up to 300 times the value in the seawater (6000). Marine animals have 0.2 ppm Sb (6019).

Geochemical considerations:

Sb was less than 5 µg/l in the Columbia River over a four-year period (6103); ".... any dissolved antimony that might be discarded to natural waters would soon precipitate and be removed by sedimentation and/or adsorption" (6000).

Industrial sources:

Antimony and its salts are used in metallurgy, rubber, textile, fireworks, paint, ceramic and glass industries (6000). Also used in the leather and dyeing industries (6000).

Analytical considerations:

Immediate filtration advisable. Samples stored in pyrex for up to two years showed no irregularities (6141).

ANTIMONY continued

Conclusions:

Concentration of antimony can be expected to be less than 0.5 µg/l regardless of location.

ARSENIC

Physico-chemical form:

Occurs as arsenite (As II), arsenate (As III), dissolved organic arsenic, and As in suspended material (organic and inorganic) (6060). There is disagreement as to the distribution of As between these forms. Gorgy *et al.* show 50-60% arsenite, 8-16% arsenate, ~25% dissolved organic, ~10% particulate (6060). Ishibashi *et al.* found primarily arsenite (6212). Work of Armstrong and Harvey, and thermodynamic data indicate that arsenate should be the main species (6128). Goldberg states that although arsenite is thermodynamically unstable, a reaction site is needed for the equilibrium to be reached (6059).

Observed distributions:

San Juan Islands: Up to 30 µg/l observed by Barnes, Thompson, and Robinson (unpublished data, 6164).

Pacific Ocean: Gorgy *et al.* show total arsenic values from 15 to 37 µg As/l (6060) with an average of 28 µg As/l (my calculation). No consistent variations with depth (6060) (my calculation).

Japan--coastal Pacific: Ishibashi and coworkers found 2.5 to 6.6 µg/l, 3-6 µg/l, and 2.5 to 6.6 µg/l respectively for coastal waters (6077, 6088, 6212).

Coastal Atlantic: Young *et al.* found values between 1.1 and 1.5 µg As/l in the nearshore environment and 0.75 µg As/l for a seawater lake (6177), somewhat lower than the oceanic values of Smales and Pate (2.6 µg As/l) (6149) and Portmann and Riley (2.0 µg As/l) (6128).

Atlantic: Rakestraw and Lutz found a mean of 15 µg/l with no increase with depth (6133).

Northwest Pacific, Indian, and Antarctic Oceans: Sugawara et al. found from 0.5 to 3.8 μg/l (6157).

Black Sea: Lyubimova found from 2.0 to 10 μg/l from 0 to 2,000 m. Values did not increase with depth (6198).

Gullmarsfjord: Noddack and Noddack found 3 μg/l (6121).

Biological considerations:

Organisms concentrate As up to 1000 times (6060). Up to 30,000 μg As/l is found in marine plants, with highest values occurring in brown algae. 5 to 300 μg As/l has been found in marine animals. As is accumulated by coelenterates, some molluscs, and crustaceans (6004); see also Junkins (6227).

Geochemical considerations:

Kopp and Kroner found 30 and 49 μg/l in two samples from the Columbia River at Clatskanie (6251), but Silker found around 1 μg/l further upstream (6045).

Industrial sources:

Many weed killers, sheep-dip liquors and tannery effluents have high As contents (6098). Poisoning in the Thames River was attributed to arsenic since dead organisms were abnormally high in As (6149). Chapman found high As values in the Thames estuary in 1926 (6164).

As used in metallurgy, glassware and ceramics, tanneries, dye manufacturing, and in chemical industries. Major use in pesticides (insects, weeds, fungi), and as a wood preservative (6000).

Analytical considerations:

Immediate filtration is recommended on the basis of the distribution of arsenic among several forms (6060). Arsenic adsorbs on containers with polyethylene, pyrex, and soda glass adsorbing 6%, 6%, and 16% respectively at steady state (6128).

Conclusions:

Values between 1.0 and 3.0 μg/l could be reasonably expected, although higher values may be possible.

BARIUM

Physico-chemical form:

Primarily ionic, but possibly some organically bound. $BaSO_4$ complexes (6059).

Observed distributions:

Equatorial Pacific: Chow and Goldberg found surface concentrations of about 12 μg/l. Values increased with depth to a maximum at 4392 m of 63 μg/l. Values were somewhat lower in the South Pacific (6033).

Off Bermuda: Chow and Patterson found an almost homogeneous profile in the open ocean with 16 μg/l at the surface. They found 16 μg/l in surface waters of a lagoon (6035).

All Oceans: Bolter *et al.* found surface concentrations consistently around 13 μg/l (6016).

Biological considerations:

Turekian and Tausch in the Atlantic and Goldberg and Arrhenius in the Pacific have shown that barium content of sediments correlates well with surface productivity of overlying waters (6016).

Geochemical considerations:

4-60 μg/l Ba in the Columbia River over a 4-year period (6103). Durum and Haffty found 42 μg/l (6208). Bermuda lagoon values were lower than adjacent oceans (6035). Clay minerals adsorb Ba from seawater (6180).

Industrial sources:

$BaSO_4$, $BaCO_3$, and other Ba or associated minerals are mined (6098). Ba salts are used in the metallurgical, paint, marine cement, ceramic, glass, dyeing and tanning industries (6000). Ba used as a depilatory, and in the vacuum tube, pyrotechnics, and rubber industries (6000).

Analytical considerations:

Due to the solubility of the most common particulate form of Ba ($BaSO_4$) (6059), immediate filtration is advisable. Filtered samples can probably be stored indefinitely.

Conclusions:

Barium values are expected to fluctuate around 13 μg/l in coastal waters.

BERYLLIUM

Physico-chemical form:

32% associated with particulate matter, 68% soluble (< 0.45 μ) (6112). Does not form complexes with $SO_4^=$(6059).

Observed distributions:

All Oceans: Merrill et al. found 3.9×10^{-4} μg/l soluble, and 1.8×10^{-4} μg/l particulate Be for deep waters. Scripps pier samples contained 0.7, 2.3, and 2.2×10^{-4} μg/l soluble, and 1.5, 0.8, and 0.5×10^{-4} μg/l particulate, or 2.2, 3.1, and 2.7×10^{-4} μg/l total Be (6112).

Offshore Japan: Ishibashi et al. found 0.38 μg/l in the inland sea and 0.03 μg/l in the Pacific Ocean (6210).

Biological considerations:

Geochemical considerations:

Beryllium was less than 0.03 μg/l over a four-year period in the Columbia River (6103). Rivers in northern California had 0.012 μg/l dissolved Be and 0.042 μg/l total Be (6112). Samples from Scripps pier were similar to the open ocean (6112).

BERYLLIUM continued

Industrial sources:

May be an indicator of industrial pollution (6112). Be is used in metallurgy, manufacture of x-ray tubes and neon signs. Be is also used in nuclear reactors (6000).

Analytical considerations:

Immediate filtration is suggested as 7-30% of Beryllium in samples stored in polyethylene became adsorbed on the container walls (6112) disturbing the equilibrium between soluble and particulate fractions.

Conclusions:

Nearshore surface waters are expected to contain 0.0003 μg Be/l. River diluted waters might be somewhat higher.

BISMUTH

Physico-chemical form:

Ionic, complexed by chloride (6020). $BiCl_4^-$ (6179). BiO^+ predominates over $BiCl_4^-$ with Bi^{+++} playing only a minor role (6102).

Observed distributions:

Atlantic Ocean: Portmann and Riley found 0.033 μg/l for North Atlantic surface waters, and 0.015 μg/l for 2000 m in the same location. Two English Channel surface samples gave 0.024 and 0.026 μg/l and two Irish Sea samples gave 0.042 and 0.035 μg/l (6130).

Unspecified: Brooks found 0.017 μg/l using ion exchange concentration (6020).

Gullmarsfjord: Noddack and Noddack found 0.2 μg/l (2131).

Biological considerations:

Marine animals contain from 0.04 to 0.3 ppm (6019).

BISMUTH continued

Geochemical considerations:

Among the elements studied by Krauskopf Bi was one of least effectively removed from seawater, as indicated by its relatively long residence time (6102). Bi concentration was less than 5 µg/l in the Columbia River over a four-year period (6103). Local precipitation of sulfides is a possible factor in determining Bi concentration in the marine environment (6102).

Industrial sources:

Analytical considerations:

Storage of filtered samples in high density polyethylene, soda glass, and pyrex glass caused losses of 50%, 75%, and 61% of bismuth. If filtered and acidified to 0.1 N with HCl, no losses occurred (6130).

Conclusions:

Surface concentrations should generally be less than 0.05 µg/l.

CADMIUM

Physico-chemical form:

Ionic, divalent cadmium, Cd^{+2}, and sulfate complexes, $CdSO_4^0$ (6059). Complexed by chloride (6020). $CdCl^+$ and $CdCl_2$ are probably predominant species (6102). $CdCl^+$ is the main species (6099).

Observed distributions:

English Channel--Irish Sea: Mullin and Riley found a July mean of 0.096 µg/l and a February mean of 0.180 µg/l. In the Irish Sea, the November-December mean was 0.101 µg/l and the April-May mean was 0.057 µg/l (6118).

Caribbean: Lowman *et al.* found 0.11 µg/l for the open sea (6110).

Japan Coastal: Ishibashi *et al.* found 0.08 to 0.17 µg/l (6091).

Gullmarsfjord: Noddack and Noddack found less than 0.5 µg/l.

Biological considerations:

Marine plants contain up to 400 µg/l, and marine animals from 150-3000 µg/l (6004). The biosphere may be a major removal pathway for Cadmium (6021).

Geochemical considerations:

Less than 0. 2 µg/l in the Columbia River (6251). Three Caribbean rivers had about four times the dissolved cadmium of surrounding seawater. River particulate matter contained about 0. 8 µg/l cadmium, two times the dissolved river concentrations (6110).

Industrial sources:

Cd is used in metallurgy, electroplating, ceramics, pigmentation, photographic, and nuclear reactors. Cd is also used in insecticides, and antohelminthics. Textile printing plants, lead mines, and chemical industries produce Cd wastes (6000).

Analytical considerations:

If filtered upon collection, storage in polyethylene is safe for at least five weeks. Soft glass apparently does raise cadmium values (6118).

Conclusions:

Cadmium values are consistently around 0. 06 to 0. 18 µg/l.

CESIUM

Physico-chemical form:

Primarily Cs^+ in solution (6059).

Observed distributions:

Scripps pier: Folsom *et al.* found 0. 335 ± 0. 012 µg/l from Scripps pier and 0. 35 ± 0. 024 µg/l for all surface samples. The mean of six samples from 500 to 1500 was 0. 40 ± 0. 037 µg/l and the mean of three samples from 2500 to 4000 m was 0. 36 ± 0. 021 µg/l. The mean of all samples was 0.37 ± 0.035 μg/l at 35.000 ‰ salinity (6052).

All oceans: Bolter et al. found cesium concentrations consistently around 0.30 μg/l (6016).

Pacific; Japan: Ishibashi and Hara found 0.4 to 1.3 μg/l (6079).

Pacific; Japanese coastal: Ishibashi and Hara found 3.4 to 4.3 μg/l (6078).

Biological considerations:

Concentrated by seaweed up to 0.07 ppm (6150), and by other organisms (6052). However, most is regenerated in the upper 1000 m (6016) in agreement with slightly higher Cs values between 500 and 1500 m (6052). Concentration factors for various marine organisms range between 50 and 10,000 (6000).

Geochemical considerations:

Schutz and Turekian show that nearshore processes may be important (6141), but the long residence time and lack of appreciable adsorption on sediments (6016), suggest quantitatively little nearshore removal. High Cs values in clays and zeolites (6052) provide some agreement.

Industrial sources:

Used in manufacturing of photographic cells (6000).

Analytical considerations:

Schutz and Turekian found no irregularities in data from filtered samples stored in pyrex for up to six months (6141).

Conclusions:

Cesium concentrations run around 0.3 to 0.4 μg/l.

CHROMIUM

Physico-chemical form:

Cr^{+3} and $CrO_4^{=}$ both found in sea water. Thermodynamic calculation favors $CrO_4^{=}$. Cr^{+3} may be significantly adsorbed on particulate matter. $CrO_4^{=}$ is not. Observed ratio $Cr^{+3}/CrO_4^{=}$ may be determined by reduction of $CrO_4^{=}$ to Cr^{+3} by "organic" reactions in sea water (6269).

Observed distributions:

Pacific: Fukai and Vas found 0.04 to 0.17 μg Cr/l dissolved trivalent chromium, 0.17 to 0.79 (?) μg Cr/l dissolved hexavalent chromium and 0.03 to 0.12 μg Cr/l particulate chromium near Japan (6259, 6256).

Eastern Pacific: Chan and coworkers found 1.59 ± 0.06 in surface waters 100 miles off Hong Kong (6264).

British Isles: Loveridge et al. found a January average of 0.13 μg/l and a September average of 0.25 μg/l for samples filtered with a 1 μ filter. Unfiltered coastal samples gave 0.13 to 0.25 μg/l (6109). Chuecas and Riley found 0.46 ± 0.016 μg Cr/l in the Irish Sea (6039). Morris found 0.29 ± 0.07 μg/l in the Menai Straits (6117).

Gullmarsfjord: Noddack and Noddack found less than 0.2 μg/l (6121).

Sea of Japan: Ishibashi found 0.04, 0.05, and 0.07 μg/l in 3 samples from the Sea of Japan (6077).

Miscellaneous: Fukai found from less than 0.02 to 0.23 μg Cr/l trivalent chromium, depending on depth and season. He found 0.05 to greater than 0.36 μg Cr/l hexavalent chromium. The highest hexavalent and lowest trivalent chromium concentration occurred at the surface in June and July (6219).

Miscellaneous: Fukai and Huynh-ngoc have reviewed the behavior of chromium in seawater (6269).

Biological considerations:

Algae concentrate Cr 100 to 500 times or more (6000). Marine plants contain up to 1000 μg/l. Marine animals contain from 200 to 1000 μg/l (6004); see also Foster (6225).

CHROMIUM continued

Geochemical considerations:

Columbia River samples had average of 1.9 µg/l (6251). However, another investigation reported 9, 18, and 20 µg/l at various seasons of a year (6249). The ratio of concentration in deep sea and near-shore sediments probably less than unity (6180), suggesting near-shore removal is an important process.

Industrial sources:

Chromium wastes are produced in chromate manufacturing (Cr VI), chromium plating (Cr VI), aluminum anodizing (Cr VI), and tanning (Cr III) and leather industries (6098). Cr (VI) is also used in paint manufacturing, dyes, explosives, ceramics, paper, and other industries. Cr (III) is used in textile dyeing, ceramic and glass industries, and in photography. Cr (VI) is also used as a corrosion inhibitor in cooling systems (6000).

Analytical considerations:

If filtered and acidified to pH 2.0, seawater can be stored with no losses in polyethylene (6039). May be able to store samples in pyrex if filtered but not acidified (6141). Immediate filtration may not be necessary, but evidence is inconclusive (6109).

Conclusions:

Surface values range from 0.2 to 0.5 µg Cr/l.

COBALT

Physico-chemical form:

"... predominantly in the free divalent cationic form ..." (6117). Co^{2+}, and some $CoSO_4^0$ (6059). Krauskopf suggested that Co^{++} and $CoCl^+$ were the principal forms, with perhaps some $Co(OH)^+$ (6102). $CoCl^+$ or $Co(OH)^+$ tentatively confirmed (6125).

Observed distributions:

Puget Sound and San Juan Islands: Thompson and Laevastu found an average of 0.28 µg/l with a range of 0.23-0.32 µg/l (6163).

COBALT continued

California coast: Weiss and Reed found 0.038 μg/l in each of two unfiltered samples taken in July, 40 miles west of San Francisco (6174).

Hawaii: Forster and Zeitlin found 0.42 μg/l (0.41 ppb) off Hawaii (6054).

All oceans: Schutz and Turekian and Turekian and Schutz found an average oceanic value of 0.27 μg/l with range of 0.035 μg/l to 4.1 μg/l (6141). The East Pacific Oean averaged 0.11 μg/l and the Central Pacific 0.75 μg/l (6197). In the Central Pacific (16°09'S, 151°31'W) they found surface values of 0.25 and 0.22 μg Co/l (6151).

Other studies giving values from 0.07 to 0.67 μg/l are 6177, 6117, 6110, 6186 and 6121.

Biological considerations:

Co is an "essential" micronutrient due to its use in making of Vitamin B_{12} (6054). It has been specifically shown to be necessary for certain annelids, crustacea, and molluscs (6004). Organisms probably return most to the water column. Areas of upwelling exhibit high cobalt values (6141). Organic reactions may be important in controlling removal from seawater (6102, 6180, 6185). A concentration factor of 1500 was reported for a flagellate (Ochromonas) (6000). Marine plants contain up to 11,000 μg Co/l. Marine animals contain from 4,000 to 50,000 μg Co/l. Cobalt is also accumulated by some sponges. Plankton concentrate Co by factors of 1000 to 5000 (6004); see also Lowman (6229).

Geochemical considerations:

Less than 1 μg/l in the Columbia River, 1958 - 1967 (6103, 6251, 6208). Most stream Co is removed on the continental margin. Long Island Sound is little different from nearby oceanic areas (6141). Two to three hours after mixing filtered (0.45μ) river and sea waters, almost all of the cobalt had precipitated (6110). Krauskopf concluded that cobalt is not primarily removed by either adsorption or local sulphide precipitation (6102). Cobalt concentration in pelagic sediments is nine times nearshore concentration (6180), suggesting nearshore removal is unimportant. Cobalt is among the elements most effectively removed from sea water. (The "residence time" is short.) (6102).

COBALT continued

Industrial sources:

Cobalt is used in making alloys, in galvanizing, in nuclear technology, as a pigment, in the China and glass industries and in binders in the tungsten-carbide tool industry (6000).

Analytical considerations:

Non-metallic samplers and immediate filtration are recommended (6163). Weiss and Reed demonstrated no loss due to adsorption on polyethylene (6174) and Schutz and Turekian found no data discrepancies in samples stored in pyrex for up to six months (6141).

Conclusions:

Values may range from 0.035 to 4.1 μg/l with most falling between 0.2 and 0.7 μg/l.

COPPER

Physico-chemical form:

". . . predominantly in the free divalent cationic form" (6117), but adsorbed on hydrous oxides (6109). Cu^{2+}, and some $CuSO_4^0$ complexes (6059). Krauskopf suggested that the $CuCl^+$ concentration was 1/3 of the Cu^{++} concentration and $CuCl_2$, 1/30. $Cu(OH)^{++}$may be a complicating factor (6102). Cu exists "primarily as a soluble complex," probably organic (6192). Also see Slowey et al. (6127) and Williams (6040). Copper in equilibrium with $Cu(OH)_2$ in sea water is 20 μg/l at pH 8.0 (calculated) (6213).

Observed distributions:

San Juan Channel - Washington Coast: Chow and Thompson found a summer average maximum of 1.8 μg/l and an autumn average minimum of 1.0 μg/l. The average value was 1.5 μg/l and the range, 0.76 μg/l to 3.8 μg/l (6037). Vertical distribution in the San Juan Channel between 0 and 100 m was essentially uniform with a range from 1.3 to 1.4 μg/l (6037). Surface concentrations in August were:

COPPER continued

48°30'N	124°44'W	1.1 μg/l
48°31'N	126°47'W	1.3
48°33'N	130°04'W	1.0
47°37'N	136°15'W	1.1
46°52'N	128°27'W	1.3
46°45'N	125°40'W	1.0

Friday Harbor, Washington: Brown found little variation from 2.7 μg/l (6217).

Southern California coastal: Williams found from 0 to 5 μg/l total soluble copper (6040).

Nearshore and Oceanic, Japan: Morita found average values of 2.4 μg/l in Tokyo and Ise Bays and in Misaki Channel with a range of 1.0 to 5.7 μg/l Cu (6115). In Sagami and Suruga Bays in February, values ranged from 0.3 to 1.5 μg/l with highest values at 1000 m. The oceanic values (in the Kuroshio) ranged between 0.5 and 0.7 μg/l in May (6115).

Pacific Ocean; New Zealand: Brooks found surface values averaging 4.9 μg/l. Samples were filtered and oxidized (6189).

Atlantic and Pacific Oceans: Fabricand et al. found surface value of 2.0 μg/l at 32°40'N, 117°26'W in the Eastern Pacific Ocean. Values in the Atlantic Ocean ranged from 1.1 to 2.2 μg/l. Samples were not filtered (6050).

Other studies include some showing values up to 600 μg/l in Connecticut harbors (6195) (6056). Ocean values given range from 0.9 μg/l to 27 μg/l (6109, 6177, 6110, 6117, 6135, 6121, 6192, 6196, 6193, 6188, 6201, 6167, and 6095).

Biological considerations:

There are seasonal trends in observed distributions (6007). Concentrations increase from 200 m to the bottom in a coastal area (6115). Concentration factors range up to 5000 for the soft parts of marine invertebrates (6000). Plankton have concentration factors from 1000 to 5000 (6000). Biogeneous copper was about equal to lithogeneous in a stagnant fjord (6185).

COPPER continued

Geochemical considerations:

1-50 μg/l in the Columbia River (6103) averaging about 10 μg/l (6251, 6208). Tributaries of the Fraser River have four times oceanic concentrations of copper (6037). Some Caribbean rivers have one to ten times oceanic concentrations of soluble copper, and an additional two to twenty-seven times associated with particulate matter. 18% of the "soluble" copper in these river waters is precipitated when mixed with filtered seawater (6110). Chow and Thompson cite an abnormally high value off the mouth of the Mississippi River (6037). Cu slightly higher in Japanese bays than in the adjacent open ocean (6116). Inshore values (~ 20 μg/l total Cu) are higher than offshore values (~ 10 μg/l total Cu) in the Straits of Florida (6192). Under certain conditions, shallow sediments may give up dissolved Cu to seawater (6037). Cu intermediate in effectiveness of removal from seawater (6102). Local sulfide precipitation and adsorption (6102) and biological activity (6180) are possible removal mechanisms. Concentrations in pelagic sediment are higher than those in nearshore sediments (6180).

Industrial sources:

Copper is found in wastes from Cu pickling and plating processes, and cuprammonium rayon manufacturing (6098). Copper salts are also used in textile processes, pigmentation, tanning, photography, engraving, insecticides, fungicides, and other industrial processes. Copper nitrate is used in pyrotechnics (6000).

Analytical considerations:

Contamination is a major problem in collection due to the extensive use of copper and brass in marine equipment (6037). Filtration is advisable. Apparently, copper does not adsorb on glass (6036). Loveridge and coworkers suggest immediate filtration and acidification to pH $\gtrsim$ 2.0 (6109). 10 % of copper adsorbed on the walls of a new PVC sampler in 90 minutes. Aged bottles showed no adsorption (6192).

Conclusions:

Copper is found in surface concentrations ranging from 0.6 to 30 μg/l with even higher values possible in harbors.

COPPER continued

	Dissolved μg/l	Dissolved and total < 0.45 μ μg/l	Particulate μg/l
Open ocean	1 ± 1	< 10	1-120
Coastal	→ 10	?	→ 10,000

GALLIUM

Physico-chemical form:

Probably $Ga(OH)_4^-$ or $Ga(OH)_4(H_2O)_2^-$ since gallium is amphoteric like aluminum (6179). However, "... in many of its properties... gallium shows a greater resemblance to iron than to aluminum " (6075). May be significantly adsorbed on soluble organics (6180).

Observed distributions:

North Atlantic Ocean: Burton *et al.* found 0.032 ± 0.007 μg/l (0.031 μg/kg). Values change slightly from place to place (6023).

Gullmarsfjord: Noddack and Noddack found 0.5 μg/l (6121).

Unspecified: Ishibashi *et al.* found 0.015 - 0.02 μg/l (6090).

Biological considerations:

Biota play an insignificant role in the oceanic distribution of gallium (6023). Noddack and Noddack found concentration factors of up to 16,000 (6043). Culkin and Riley found Ga primarily in the soft parts, not hard parts of organisms. They indicated that organisms which they studied got their Ga from bottom muds, not seawater (6043).

Geochemical considerations:

Burton (6023) states that the enclosed nature of Gullmarsfjord influenced the results of Noddack and Noddack, but gave no estimates as to how much or in what direction. That gallium is not concentrated in any particular marine enivronment (6180) suggests that nearshore removal is not an important process, although Ga has been said to be associated with clay minerals (6180).

GALLIUM continued

Industrial sources:

Analytical considerations:

Immediate filtration recommended (see Physico-chemical form).

Conclusions:

Gallium concentrations will probably be around 0.03 μg/l.

GERMANIUM

Physico-chemical form:

Present in colloidal, adsorbed, and ionic forms. $GeO(OH)_3^-$ or $Ge(OH)_4$, analogous to silicon (6171, 6059).

Observed distributions:

North Atlantic Ocean: Burton et al. found 0.06 ± 0.01 μg/l regardless of season, depth, or position. The value may be 0.07 μg/l in the deep ocean (6023).

Gullmarsfjord: Noddack and Noddack found less than 0.1 μg/l (6121).

Biological considerations:

Not used in construction of hard parts of plankton and sponges (6023), but is used in soft parts (6022). Quantitatively unimportant (6171). Marine animals contain up to 0.3 ppm (?) (6019).

Geochemical considerations:

Ge may be adsorbed or ion exchanged (6023). Shelf sediments do not adsorb much Ge quantitatively (6171).

Industrial sources:

Germanium is used in manufacture of electronic devices, in metallurgical processes, and in electroplating (6000).

GERMANIUM continued

Analytical considerations:

Similarity to silicate (see Physico-chemical form) suggests similar need for care in storing samples.

Conclusions:

Cermanium concentrations should be around 0.06 μg/l.

GOLD

Physico-chemical form:

Au^{+++}, but probably strongly chloride complexed: $AuCl_4^-$ (6059, 6020). Yasuda suggested colloidal and organic colloidal associations (6164), in line with Hummel's evidence for strong association with particulate matter (6073).

Observed distributions:

Pacific Ocean: Weiss and Lai found 0.068 ± 0.003 μg/l in surface waters 40 miles west of San Francisco. Samples were not filtered (6173).

All Oceans: Schutz and Turekian found an oceanic average of 0.011 μg/l with a range of 0.004 to 0.027 μg/l (6141).

Pacific Coastal: Putnam found less than 0.5 μg/l in Puget Sound and at Bandon, Oregon, but 5.1 μg/l at Copalis Beach, Washington, and 44 μg/l at Mutiny Bay, Washington (6132). Caldwell found an average of 0.21 μg/l at Waldport, Oregon, and less than 0.05 μg/l at Agate Beach, Oregon. He found 0.4 and 1 μg/l in the Strait of Juan de Fuca (6025).

All Oceans: Hummel found from .015 to 0.400 μg/l (6073).

Other studies give around 0.01 μg/l (6020, 6121).

Biological considerations:

Concentrated by kelp (6132).

GOLD continued

Geochemical considerations:

Industrial sources:

Gold used in photography, for electrogilding, for painting on porcelain and glass, and for some therapeutic purposes (6000).

Analytical considerations:

Filtration is recommended in light of strong particulate association. Acidification at collection prevents Au adsorption on walls of polyethylene containers (6173).

Conclusions:

Gold ($< 0.45\ \mu$) probably amounts to around 0.01 µg/l. Particulate gold can raise nearshore values perhaps as high as 44 µg/l.

HAFNIUM

Physico-chemical form:

HfO^{++}, similar to ZrO^{++} (6179) is possible in aqueous solution.

Observed distributions:

Schutz and Turekian failed to detect hafnium with a lower limit of detection of 0.008 µg/l (6141).

Biological considerations:

Marine plants contain less than 0.4 ppm (s.w. < 0.000008 ppm) (6019).

Geochemical considerations:

Industrial sources:

Analytical considerations:

Hafnium is "known to be adsorbed quickly on most surfaces" (6141).

HAFNIUM continued

Conclusions:

Concentrations of hafnium in seawater are very low (< 0.008 µg/l).

INDIUM

Physico-chemical form:

The chemistry of indium is similar to aluminum, gallium, and thallium. The hydroxide, $In(OH)_3^0$ may (6143), or may not (6179) be amphoteric. In^{+++} may form $InCl_6^{---}$ ions in seawater (6179). At pH 8 in sea water, $In(OH)_2^+$ is predominant (6204).

Observed distributions:

The amount in solution in seawater is too small to detect (6143). Baric and Branica calculated an upper limit of 0.012 µg/l (6204).

Biological considerations:

There is some evidence for biological concentration (high values in carbonaceous shales and coal ash) (6143), but it has not been recorded in any living organism (6075).

Geochemical considerations:

Following weathering, In is probably transported as the colloidal hydroxide, which flocculates when it reaches the sea (6143).

Industrial sources:

Analytical considerations:

Conclusions:

Concentrations of indium in seawater are low.

IRON

Physico-chemical form:

Iron is found mainly as colloidal Fe (III) hydroxide and Fe (III) phosphate (6108). Iron is also found in organic complexes, in dead and living phyto- and zooplankton, in clay minerals and other terrigenous inorganic matter, and in soluble hydrated iron oxides (6176), $Fe(OH)_3$ (6059). Ratio of particulate to soluble non-ionic iron was 1:1 for tropical waters (6193).

Observed distributions:

Northeast Pacific: Williams and Chan determined soluble, particulate, HCl-reactive soluble and HCl-reactive particulate iron in the area of the mouth of the Strait of Juan de Fuca . Mean values for total soluble iron were about 1-3 µg/l in the winter, and about 3-15 µg/l in the summer. Mean values for total particulate iron were about 20 µg/l in the winter, and about 5 µg/l in the summer, decreasing towards the open ocean (6176). Joyner determined particulate iron, finding from 0.5 to 3.0 µg/l in the open ocean, and up to 88µg/l near the mouth of the Columbia River (6094). Strickland determined a "total reactive iron" value of 4.6 µg/l at 5 m. He also found "coastal values ranging from 8.4 to 16 µg/l (6156). Strickland and Austin found generally less than 17 µg/l total reactive iron, about one-half particulate and one-half soluble (6199). Thompson and Bremner measure soluble and total iron concentrations. In the upper 100 m, soluble iron ranged from 2 to 4 µg/l and total iron from 14 to 17 µg/l (6162). Values for soluble iron are thought to be high (6181). Thompson and Bremner also made measurements off the mouth of the Fraser River and in the Strait of Juan de Fuca.

Strait of Juan de Fuca: Laevastu and Thompson found values of 5.5 µg/l (5 m) and 27 µg/l (100 m) soluble iron. Particulate iron was 93 µg/l (5 m) and 111 µg/l (100 m). They also made measurements in Puget Sound and the San Juan Islands (6105). Thompson and Robinson report 37 µg/l at the surface and 280 µg/l at 150 to 200 m. In the Haro Strait, the surface value was 42 µg/l and the 300 m value was 188 µg/l. At Friday Harbor, the surface value was 30 µg/l and the 150-200 m value was 85 µg/l. All measurements were made in the summer (6164).

North Pacific Ocean: McAllister *et al.* found 1.84-7.32 µg/l dissolved iron (6186) at ocean station "P" (Papa).

All Oceans: Lewis and Goldberg report consistant values of 3.4 μg/l soluble iron, and of 4.5 μg/l particulate iron, the latter only below 500 m. Particulate values are scattered above 500 m. Measurements showed that about 75% of soluble iron unreactive by their method, prior to oxidation (6108).

Atlantic and Pacific Oceans: Fabricand et al. found 6.1 μg/l in surface waters at 32°40'N, 117°20'W, and between 5.6 and 7.3 μg/l at depths of 500-1600 feet in the Atlantic (6050).

Pacific Ocean; Hawaii: Zeitlin and Lei found monthly averages of particulate iron ranging from 28 to 192 μg/l (6200).

Other studies have found from 0 to 9 μg/l soluble iron (6146, 6184, 6005, 6117, 6068, 6110, 6121, 6193, and 6263).

Biological considerations:

Concentration factors from 720 to 200,000 have been measured, the latter for phytoplankton (6000). Lewis and Goldberg cite references indicating that plankton use only particulate iron, and indicate that much of this iron is recycled in the upper water layers (6108). Similarly, a summer increase of soluble iron at expense of particulate iron was attributed partially to assimilation of particulate iron by phytoplankton and subsequent release of soluble iron (6176). "Iron, in addition to suitable chelating and/or complexing agents, was considered to be one of the limiting factors for continued growth in tropical waters" (6194). See also Lowman (6229).

Geochemical considerations:

Particulate iron generally decreases with distance from land (6176, 6005). Rivers do not contribute significantly to the soluble concentration (6162), so that soluble iron does not evidence such a decrease (6176). The Columbia River had between 2 and 90 μg/l from 1958 to 1962 (6103). Kopp and Kroner later found a four-year average of 31 μg/l at Clatskanie, Oregon (6251). Values as high as 280 μg/l were found at The Dalles, Oregon (6249). Three Caribbean rivers had 4 to 20 times oceanic values for soluble iron. Soluble iron comprised between 1% and 4% of the total iron in the river (6110). Three hours after mixing filtered river and sea waters, 93% of the soluble iron had precipitated (6110). Total iron ranged from 25 μg/l inshore to 0.5 μg/l offshore in tropical waters (6194).

IRON continued

Industrial sources.

Iron pollution can be due to iron pickling liquors, ochre waters from coal mines, drainage from coal tips, and galvanizing and wire drawing wastes (6098). Wastes from mining, ore milling, chemical and dyeing industries, and water and sewage works are also potential pollutants (6000).

Analytical considerations:

Since ships and hydrographic wires are made of steel, contamination is a problem. Filtration (0.45 μ) and acidification on collection prevents adsorption on glass bottle walls (6005), but can also change amount of "reactive" iron in seawater by dissolving organics and colloids (6176). Iron may also be released by glass. Polyethylene adsorbs iron strongly. Processes used to decompose organic matter can leach iron from glassware. Silica is recommended (6005).

Conclusions:

Total iron (particulate + soluble) can run as high as 300 μg/l in coastal waters. Soluble iron is low (0-5 μg/l) in the winter, and higher (up to 20 μg/l) in the summer.

LEAD

Physico-chemical form:

Goldberg states that the primary species are Pb^{++} and $PbSO_4^0$ (6059), but Krauskopf had suggested that $PbCl^+$ was the chief species (6102). It is adsorbed on hydrous oxides (6109), clay minerals and organic matter (6102), with about half in true solution (6160). Pb readily coordinates with organic ligands (6021).

Observed distributions:

San Juan Channel: Chow found the vertical distributions shown below in August at 48°36'N, 123°04'W (6031).

LEAD continued

	depth (m)	Cl (‰)	Lead (µg/l)
Mid-channel:	0	16.73	0.10
	25	16.58	0.22
	50	16.73	0.14
	75	16.68	0.12
	100	16.79	0.17
Off Jones Island:	25	16.78	0.07
	50	16.84	0.07
	75	16.99	0.15
	100	17.18	0.11

Pacific Ocean: Tatsumoto and Patterson found 0.36 µg/l at the surface decreasing with depth to 0.02 µg/l at 4000 m at [illegible]9°13'N and 117°37'W (6160).

British Isles: Loveridge et al. found averages up to 1.5 µg/l 20 miles offshore. Samples were filtered with 1 µ filters (6109).

Deep Oceans: Chow shows that deep waters of the Atlantic Ocean now have 0.04 µg/l, Pacific Ocean 0.03 µg/l, and the Mediterranean Sea 0.03 µg/l. From this data Chow estimates the surface preindustrial oceanic concentration to be 0.02 µg/l (6032).

Gullmarsfjord: Noddack and Noddack found 5 µg/l (6121).

Biological considerations:

Observed vertical oceanic profile probably due to significant biological transport (6160). Sedimentation of pteropod shells has been suggested as a mechanism for removal of lead from seawater (6120). Marine plants contain up to 8400 µg/l and marine animals up to 500 µg/l (6004).

Geochemical considerations:

Rivers generally have a high concentration of industrial lead, but the Columbia River only had more than 4 µg/l in 9 of 31 samples in the time period 1958-1962 (6103). The Columbia averaged about 2 µg/l (6251) or 3.2 µg/l (6208).

LEAD continued

Industrial sources:

Use of tetraethyl lead in industrial fuels results in high surface inputs of Pb (6160), and others. Lead wastes are produced by lead mines, by manufacturing of accumulators, by lead paint production, and pewter ware manufacturing (6098). Lead salts are used in printing and dyeing, match and explosive manufacturing, photography, and engraving, in fabric weighting, lithography, and in galvanic batteries (6000).

Analytical considerations:

Extensive use of lead base paints on shipboard makes contamination in collection a real danger (6160). Silica containers are preferred to glass as Pb may be leached from even pyrex (6109, 6160). Polyethylene adsorbs lead (6160). Contamination, even in the dust in the air, makes extreme care mandatory (6109) and others.

Conclusions:

Lead can run as high as 1.5 μg/l depending on the degree of local pollution. Typical values run around 0.10 μg/l.

LITHIUM

Physico-chemical form:

Lithium in seawater exists as the strongly hydrated Li^+ ion (6034).

Observed distributions:

All Oceans: Chow and Goldberg found an average of 170 μg/l with a range of 159 to 178 μg/l. The Li/Cl ratio was $8.94 \pm 0.12 \times 10^{-6}$. Samples were not filtered. They state that previously reported coastal values are probably affected more by methodology than sample location (6034). Riley and Tongudai found 183 ± 3 μg/l at a salinity of 35‰. The Li/Cl ratio was $9.39 \pm 0.17 \times 10^{-6}$ (6136).

Biological considerations:

Lithium is "not markedly enriched in the marine biosphere" (6034).

LITHIUM continued

Geochemical considerations:

Chow and Goldberg supposed a drainage effect, but data are lacking (6034). The Columbia River contains an average of 2.2 μg/l (6208), 3.9 μg/l and 0.59 μg/l were found at two different times of year (6249).

Industrial sources:

Lithium is used in metallurgy, in medicinal waters, in manufacture of certain types of glass, in storage batteries, in production of glazes on ceramic and electrical porcelain, in pyrotechnics, and in soldering aluminum (6000).

Analytical considerations:

Conclusions:

Lithium is found in seawater in concentrations of 160-190 μg/l.

MANGANESE

Physico-chemical form:

Manganese occurs in seawater as Mn^{++} and $MnSO_4{}^0$ (6059). Estimates of the amount associated with particulate matter include "most" (6109, 6110). Organic complexes are indicated by analytical data (6137). In nearshore areas, Mn^{++} goes to MnO_2 which deposits rapidly. Mn^{++} may also be exchangeable on clays. $Mn(OH)_3$ and $Mn(OH)_4$ have also been suggested as Mn species in seawater (6234).

Observed distributions:

Washington Coast: Thompson and Wilson found from 3 to 10 μg/l above 100 m. They found similar values in the San Juan Islands (6165).

Pacific Ocean and Gulf of Mexico: Rona and coworkers found the following values for the Pacific Ocean:

MANGANESE continued

Location		Depth (m)	Mn (μg/l)
35°50'N	124°30'W	0	0.65
"	"	2400	1.26
20°30'N	117°40'W	0	0.78
"	"	2400	1.80
41°24'N	86°11'W	1235	1.60
"	"	2340	1.30
39°33'S	84°10'W	3500	1.50
43°50'S	105°30'W	3500	1.50
35°09'N	157°17'W	18	0.85
"	"	159	1.40
"	"	2300	5.80
"	"	4100	8.60
"	"	5440	1.20

In the Gulf of Mexico, they found between 0.2 and 3.9 μg/l with values decreasing with distance from shore (6137).

North Pacific Ocean: McAllister _et al_. found values ranging from 0.17 μg/l (5 m) to 1.7 μg/l (5 m) at Ocean Station "P" (6119). McAllister _et al_. found 0.27 to 0.93 μg/l at Ocean Station "P" from 300 to 1000 m (6186).

Atlantic and Pacific: Fabricand _et al_. found 4.0 μg/l at 32°40'N, 117°26'W in the East Pacific, and from 3.0 to 4.4 μg/l between 500 and 1600 ft. in the Atlantic (6050).

Other investigators have found from 0.6 to 3.0 μg/l dissolved manganese (6109, 6121) but much higher values for particulate manganese (6211, 6187).

Biological Considerations:

0.5 μg Mn/l added to cultures stimulated growth of diatoms and flagellates, with quantities as low as 0.1 μg Mn/l effective for _Chlamydomonas_ (6244). Incorporation into foraminiferal tests may be a significant manganese removal process (6180). High Mn concentrations are observed in closed basins with high organic matter content (6137).

MANGANESE continued

Geochemical considerations:

Samples taken from the Columbia River in the period 1958-1962 had between 3 and 5 µg/l (6103). Kopp and Kroner later found an average of 1.5 µg/l (6251). An average of 10 µg Mn/l is reported by another worker, whose iron values are also considerably higher (6208). In the Caribbean, three rivers had 2 to 15 times oceanic Mn contents. Particulate manganese in the rivers ran as high as 350 times the oceanic soluble content. Three hours after mixing filtered (0.45 µ) river and sea waters, 30% of the manganese had precipitated (6110).

Industrial sources:

Drainage from coal and ash tips, chemical plants, and lime sludges can pollute nearby waters (6098). Manganese is used in steel alloys, for dry-cell batteries, in glass and ceramics, in the manufacture of paints and varnishes, in inks and dyes, in matches and fireworks, and in agriculture. Mn is also used in disinfectants (6000).

Analytical considerations:

Immediate filtration and acidification recommended (6109). Thompson and Wilson demonstrated the need for consistency in filtering procedures (6165).

Conclusions:

Nearshore concentrations of dissolved manganese probably will be less than 10 µg/l.

MERCURY

Physico-chemical form:

Very little in simple cationic form as it is strongly complexed by chloride, giving primarily $HgCl_3^-$ and $HgCl_4^{--}$ (6059). Stability constant shows that $HgCl_4^{--}/Hg^{++}$ in seawater would be about 10^{15} (6179).

Observed distributions:

Western Pacific Ocean: Hamaguchi and coworkers found most values in the range 0. 08 to 0. 15 μg Hg/l (6065). Soyer, citing the work of Stock and Cucuel, suggests 0. 03 μg/l (6154).

Equatorial Pacific Ocean: Hosohara showed about 0. 1 μg/l at the surface, and 0. 15 to 0. 27 μg/l at 300 m (6070).

Japan, Minamata Bay: Hosohara et al. found 1. 6 to 3. 6 μg total Hg/l in oxidized samples, approximately ten times the value of unoxidized samples (6071).

Biological considerations:

Mercury (organomercury) is concentrated in food chains (6220). Fish concentrate Hg 1000 to 10,000 times (6286). Uptake of Hg is faster than excretion in fish (6003). 0. 03 ppm (dry) was found in algae (6287). Diatoms concentrate Hg primarily by surface sorption, with dead cells accumulating twice as much as live ones (6287). Dead algae sorbed 98% of mercury out of a seawater solution (6102). Converted to methylmercury by bacteria (6010) and other microorganisms in sediments (6242).

Geochemical considerations:

Mercury not notably concentrated in manganese nodules from non-volcanic areas (6285). Concentrated in sediments over seawater (6286). Strongly sorbed on sediments with some "little exchangeable" (6003). If mud concentrations are high enough, 100% of Hg is removed from seawater by adsorption (6265). May be present in sediments as the sulfide (6285, 6265) or humate (6265).

Industrial sources:

Mercury is used in the manufacture of insecticides, fungicides, and in certain paper mill procedures (6098). Hg is also used in embalming, disinfecting, preserving, fabric printing, tanning, electroplating, ink manufacturing, and is found in wastes from lead mines and chemical plants (6000). Mercuro-organic compounds are used in herbicides, fungicides, and in medical treatments (6000). Mercury is used in chlorine factories, electrical industry, and is found in fossil fuels (6281). Also finds use as a catalyst in the production of acetaldehyde and vinylchloride (6227).

Conclusions:

Mercury concentrations are expected to be between 0.08 and 0.36 µg Hg/l.

MOLYBDENUM

Physico-chemical form:

Krauskopf suggested that molybdenum in seawater was anionic (6102), and Goldberg suggested MoO_4^{--} (6059). Weiss and Lai suggested Mo^{+6} (6172).

Observed distributions:

California: Marin County: Bachmann and Goldman found 10.0 µg/l at Muir Beach in July, 1963. An independent determination by a different method gave 10.5 µg/l (6008).

California, San Francisco: Weiss and Lai found 12.2 ± 0.1 µg/l from unfiltered samples taken 40 miles due west of San Francisco (6172).

Hawaii: Kim and Zeitlin found 10.4 µg/l in unfiltered samples (6097).

Pacific Ocean: Sugawara and Okabe found 9.6-12.7 µg/l in the bays of Kinsin Island, and 8.9-12.2 µg/l near Antarctica. They found 8.6 to 11.8 µg/l in the western part of the Eastern China Sea (6209). Shugawara [sic] and coworkers found 8.6-12.5 µg/l in the open Pacific Ocean (6186). Also see Sugawara et al. (6159, 6157).

New Zealand: Brooks found surface values averaging 0.75 µg/l. Samples were filtered and oxidized (6189).

Other studies found from 0.5 to 16 µg/l molybdenum (6177, 6015, 6186, 6121).

MOLYBDENUM continued

Biological considerations:

Molybdenum is a micronutrient (6097), "essential" to algae and higher plants (6008). Concentration factors between 2 and 5 have been observed in several algae (6000). See also Barsdate (6205).

Geochemical considerations:

Samples taken in the Columbia River in a four-year period gave values of greater than 1 μg Mo/l, with the highest being 9 μg/l (6103). Kopp and Kroner found an average of 11 μg/l in the period 1962-1967 (6251). Napa and American Rivers in Northern California gave 0.8 and 0.67 μg/l respectively (6008).

Industrial sources:

Molybdenum is used in metallurgy, in electronic applications, in the glass and ceramic industries, in pigment production, and in fertilizers for vegetables (6000).

Analytical considerations:

Conclusions:

Nearshore molybdenum concentrations run from 6 to 16 μg/l.

NICKEL

Physico-chemical form:

Krauskopf says that Ni is probably similar to cobalt, which would imply Ni^{++} and $NiCl^{+}$ species (6102). Goldberg suggests Ni^{++} and $NiSO_4^{0}$ (6059). Morris says nickel occurs "... predominantly in the free divalent cationic form." (6117)

Observed distributions:

Puget Sound - San Juan Islands: Laevastu and Thompson found an average of 2.0 μg/l with a range of 1.4 to 2.7 μg/l. There was apparent dependence on salinity, depth, or season (6104).

NICKEL continued

All Oceans: Schutz and Turekian found open oceanic average of 5.4 µg/l with a range from 0.43 to 43 µg/l. A Pacific Ocean station (3°32'N, 81°11'W) gave values shown in the table below:

Depth (m)	Ni (µg/l)
14	10.5
200	3.2
	4.8
400	1.8
	4.5
600	5.1
	6.8

Surface samples taken in the central Pacific gave 30.5 and 26.9 µg/l (6141).

Pacific Ocean, Hawaii: Forster and Zeitlin found 2.5 µg/l and 3.1 µg/l (6053, 6055).

Atlantic and Pacific Oceans: Fabricand et al. found 0.29 µg/l in surface waters 32°40'N, 117°26'W in the Pacific Ocean. In the Atlantic Ocean, they found between 0.13 and 0.37 µg/l (6050).

Other investigators found from 0.7 µg/l to 6 µg/l nickel (6117, 6015, 6193, 6186, 6110, 6121).

Biological considerations:

Nickel is concentrated by organisms by factors ranging from 100 to 100,000 (6053), but is probably all regenerated in the water column (6141). Marine plants contain up to 3000 µg/l, although plankton may be higher. 400 µg/l has been found in marine animals (6004). Areas of upwelling have high nickel concentrations (6141). Biogeneous nickel was about equal to lithogeneous in a stagnant fjord (6185).

Geochemical considerations:

In 1958-1962, 15 of 31 samples from the Columbia River had greater than 2 µg/l. The highest value was 10 µg/l (6103). Durum and Haffty found an average of about 20 µg/l (6251). Caribbean rivers had much higher soluble nickel values than the open sea. Particulate nickel in the rivers was much higher than the soluble (6110).

NICKEL continued

Within three hours after mixing filtered river and sea waters, 35% of the soluble nickel had been precipitated (6110). Nickel behaves similarly to cobalt in the marine environment (6141).

Industrial sources:

Nickel used in electroplating (6000), and in dyeing and printing (6000).

Analytical considerations:

Immediate filtration (6117) and use of plastic containers (6055) are recommended.

Conclusions:

Nickel concentrations expected to be between 0.1 and 6 μg/l with 2-3 μg/l the most probable range

NIOBIUM

Physico-chemical form:

Some may be organically bound (see 6027). Strong particulate association (6027).

Observed distributions:

English Channel: Carlisle and Hummerstone found less than 0.001 μg/l in Whatman #542 filtered samples taken 40 miles southwest of Plymouth. Unfiltered samples gave 0.01 to 0.02 μg/l. In Plymouth Sound, filtered samples gave 0.005 μg/l and unfiltered ones 0.05-0.10 μg/l. In settled weather, the same area gave 0.01 μg/l (6027).

Biological considerations:

Nb apparently has "relatively little biological significance in the sea." Radioactive niobium is concentrated only by second trophic level animals, i.e. some copepods, euphausiids, pteropods, and salps (6183). Most marine invertebrate concentrate Nb up to 0.2-2 ppm dry weight. Ascidians concentrate Nb up to 6500 ppm (6026).

NIOBIUM continued

Geochemical considerations:

Land drainage may raise Nb in unfiltered samples (6027).

Industrial sources:

Analytical considerations:

Conclusions: Concentrations may be expected to be around 0.001 to 0.05 µg Nb/l.

PALLADIUM

Physico-chemical form:

Observed distributions:

Biological considerations:

Geochemical considerations:

Industrial sources:

Palladium is used in photography, toning solutions, indelible inks, and in galvano-coating of precision parts (6000).

Analytical considerations:

Conclusions:

No information.

PLATINUM

Physico-chemical form:

Observed distributions:

Biological considerations:

Geochemical considerations:

PLATINUM continued

Industrial sources:

Pt is used in plating, photography, indelible inks, mirrors, and as a catalyzer (6000).

Analytical considerations:

Conclusions:

No information.

POLONIUM

Physico-chemical form:

Po(IV). Possibly PoO_2 hydrated; $Po(OH)_4$ or Po^{++} chlorides (6179).

Observed distributions:

Biological considerations:

Marine plankton enrichment factors may be greater than 4000 (6142).

Geochemical considerations:

Industrial sources:

Analytical considerations:

Conclusions:

No information.

RHENIUM

Physico-chemical form:

Probably occurs as the perrhenate ion, ReO_4^- (6140). May be complexed by chloride (6020).

RHENIUM continued

Observed distributions:

Pacific Ocean: Scadden found 0.0084 μg/l ±17% for four widely spaced surface samples (6140).

Biological considerations:

In brown kelp, 0.022 ppm dry weight was found (6140).

Geochemical considerations:

Industrial sources:

Analytical considerations:

Conclusions:

No information.

RHODIUM

Physico-chemical form:

Rh (III) most common valence. Easily complexed and adsorbed (see 6223).

Observed distributions:

Biological considerations:

Geochemical considerations:

Industrial sources:

Analytical considerations:

Conclusions:

No information.

RUBIDIUM

Physico-chemical form:

Occurs as the monovalent cation, Rb^+ (6059).

Observed distributions:

All Oceans: Smith et al. found 120 μg/l ± 8%. They detected a minimum in the Pacific at about 1000 m (6153). Bolter et al. found values consistently around 125 μg/l (6016).
Atlantic Ocean: Smales and Webster found 121.4 ± 1.1 μg/l for four samples taken at 4000 m in the North Atlantic (6151) (6152). Smales and Salmon had found 120 ± 10 μg/l for all waters of the North Atlantic (6150).

Gulf of Mexico, Coastal: Billings and Harriss found 170 μg/l in waters off British Honduras, and 190 μg/l in waters off Texas. For the open ocean, they got 120, 120, and 140 μg/l (6014).

Pacific: Japanese Coastal: Ishibashi and Hara found 250-400 μg/l (6078).

Miscellaneous: Borovik-Romanova found between 110 and 230 μg/l in the Barents, Okhotsk, Japan, and Karskii Seas. He found 103 μg/l in the Black Sea (6017).

Biological considerations:

Rb is concentrated by seaweeds (6150). Marine animals concentrate Rb up to 20 ppm (s. w. = 0.12 ppm) (6019).

Geochemical considerations:

Some of the high values in the "old" literature may be due to continental drainage (6153). Variations in cation ratios in coastal waters are real (6014). Rb values may increase in a core, but this is based on one sample (6150). The Columbia River has Rb values of the order of 1 μg/l (6249). The rubidium value in the Black Sea was independent of depth and nearness to shore (6017).

Industrial sources:

Rb is used in making zeolite catalysts and in photoelectric cells (6000).

RUBIDIUM continued

Analytical considerations:

Storage in polyethylene is advised (6014). No differences were found between "acidized and non-acidized" aliquots or between filtered and non-filtered aliquots (6014).

Conclusions:

Nearshore concentrations will probably be around 120 μg/l, with some local variation.

RUTHENIUM

Physico-chemical form:

Ruthenium has many valences and forms complexes easily (6223). In synthetic seawater, incomplete analytical recoveries of Ru have been attributed to the formation of complex ions, with nitrite-ruthenium complexes $[Na_2(RuCl_5 \cdot NO)]$ suggested (6138).

Observed distributions:

Biological considerations:

Concentration factors for a flagellate and diatom (Navicula) ranged from 4000 to 7900 (6000). Algae concentrate Ru-106 by a factor of 100, Invertebrates by 30. Fish did not concentrate Ru-106 (6001). Algae and invertebrates may concentrate Ru-106 by up to 2000 times (6001).

Geochemical considerations:

Industrial sources:

Ru is used in platinum and palladium alloys, and for coloring ceramics (6000).

Analytical considerations:

Conclusions:

None.

SCANDIUM

Physico-chemical form:

Sc^{+++}, behaving something like Al (6075).

Observed distributions:

All Oceans: Schutz and Turekian found less than 0.004 μg/l in all samples (6141).

Deep Atlantic Ocean: Hogdahl et al. found an average of 0.0010 μg/l in 11 samples from comparable locations and depths (6147).

Unspecified: Goldschmidt (6075) found 0.04 μg/l.

Biological considerations:

Sc is slightly concentrated (< 5X) in some marine organisms (6075).

Geochemical considerations:

Two hours after mixing filtered river and sea waters, almost complete precipitation of Sc had occurred (6110).

Industrial sources:

Analytical considerations:

Filtration is advisable. Sc is "known to be adsorbed quickly on most surfaces (6141).

Conclusions:

Scandium is about 0.001 μg/l in the oceans.

SELENIUM

Physico-chemical form:

Chau and Riley found that Se (IV) was probable, and that Se (VI) was experimentally absent (6030). This is in agreement with the $HSeO_3^-$ of McKee and Wolf (6000), but disagrees with Goldberg

SELENIUM continued

who suggested SeO_4^{--} (6059) and Cotton and Wilkinson who suggest an aqueous chemistry involving hydrates of H_2SeO_4 (6179).

Observed distributions:

All Oceans: Schutz and Turekian found 0.090 µg/l with a range of 0.052 to 0.12 µg/l. Long Island Sound had 0.11 µg/l. At 3°32'N, 81°11'W in the Eastern Pacific, the following values were obtained: (6141)

Depth (m)	Se (µg/l)
14	0.080
200	0.065
400	0.12

British Isles: Chau and Riley found 0.50 ± 0.02 µg/l in the English Channel, and 0.34 ± 0.01 µg/l in the Irish Sea (6030).

Puget Sound and Northeast Pacific: Byers et al. found values the order of magnitude of 0.25 µg/l at 46°39'N, 147°47'W at depths of 25, 100, 1000, and 2000 m (6024).

Sea of Japan, Coastal: Ishibashi and Ishibashi et al. found 4-6 µg/l (6077, 6068).

Biological considerations:

Se is "essential for animal life" and is found in seaweeds (6030). Thought to be associated with amino acids in plants (6024).

Geochemical considerations:

Long Island Sound showed slightly higher values than adjacent Atlantic Ocean (6141). Puget Sound is marginally higher than the adjacent Pacific Ocean (6024). Klein states that natural drainage from soils and rocks can be a major source of selenium "pollution" (6098).

Industrial sources:

Se is used as pigmentation in paints, dyes, and glass production, in rectifiers, semi-conductors, and photo-electrical apparatus, in the rubber industry, in alloys, and for insecticide sprays (6000). Also see land influence above.

Analytical considerations:

Certain compounds of Se encountered in commonly used analysis methods are volatile, and care is necessary to prevent losses (6030). Chau and Riley showed that samples filtered and stored in glass or high-density polyethylene in the dark at 20°C lost no appreciable amounts of Se in 10 weeks. Autoclaving after filtration does not affect this result (6181).

Conclusions:

Sea water concentrations are probably around 0.1 μg/l, with higher values near land.

SILVER

Physico-chemical form:

Monovalent silver is complexed by chloride, forming $AgCl_2^-$ and $Ag\ Cl_3^{--}$ (6059). $AgCl_2^-$ is probably predominant (6102).

Observed distributions:

California Coast: Haber found 0.01 to 0.29 μg/l at the entrance to San Francisco Bay, with a mean value of 0.07 μg/l. Inside the bay, he found 0.01 to 3.10 μg/l with a mean of 0.40 μg/l. Haber also made measurements in the Atlantic, finding 1.60 μg/l at the surface, 0.10 μg/l at 700 m, and 0.04 μg/l at 2500 m. Arctic areas were found to have surface values around 0.400 μg/l with 0.120 at 400 m and values only rarely falling below 0.100 μg/l (6154).

All Oceans: Schutz and Turekian found an average value of 0.29 μg/l with a range of 0.055 to 1.5 μg/l. Values in Long Island Sound ranged from 0.35 to 19.6 μg/l. In the Eastern Pacific Ocean, the following average values were found at 3°32'N, 81°11' W:

SILVER continued

Depth (m)	Ag (μg/l)
14	0.20
200	0.13
400	0.28
600	0.17

In the central Pacific, surface values of 0.19 and 0.22 μg/l were found (6141).

California Coast: Lai and Weiss found 0.145 ± 0.006μ g/l for surface waters 40 miles due west of San Francisco Bay (6106).

English Channel: Black and Mitchell found 2.9 and 2.1 μg/l 20 miles offshore in February and <0.4 μg/l one-half mile offshore in June (6015).

Gullmarsfjord: Noddack and Noddack found 0.15 μg/l (6121).

Biological considerations:

Some organisms concentrate Ag, but regenerate most in upper layers. Correlation of high silver values with areas of upwelling suggest "organic involvement (6141). Concentration factors are about 80 for marine algae and from 300 to 1000 for marine mammals (6004).

Geochemical considerations:

Less than 0.05 μg/l in 5 samples from the Columbia River (6103). A range of 0.09 to 0.15 μg/l was found over three different times of year (6249). Rivers emptying into Long Island Sound are high in Ag, but nearshore removal by sulfides may prevent Ag from reaching the ocean (6141). Most silver remains in estuaries (6282). Silver values are much higher near land (6154). Regeneration from bottom sediments has been suggested, but based on one relevant sample (6141).

Industrial sources:

Used in manufacture of photographic chemicals (6098). It is also used in jewelry and silverware manufacture, in alloys, for electroplating, and in processing food and beverages. Nitrates are used in ink manufacturing, coloring porcelain, and as an antiseptic (6000).

Analytical considerations:

Filtration is recommended. At pH 3.5-4.0 Ag is not adsorbed on polyethylene (6106). Schutz and Turekian detected no irregularities in data from samples stored for 6 months in pyrex (6141).

Conclusions:

Silver concentrations are probably around 0.3 μg/l except in areas directly affected by runoff.

STRONTIUM

Physico-chemical form:

Sr^{++} and $SrSO_4^0$ (6059).

Observed distributions:

Northeast Pacific Ocean: Chow and Thompson found the following vertical profile at 49°30'N, 138°14.5'W in July:

Depth (m)	Sr (mg/l)
0	7.7
5	7.8
50	7.4
200	8.0
300	7.8
750	8.0
1000	7.5
2000	8.2

The observed Sr/Cl ratio was 0.0048 ± 0.0002. A minimum in Sr was observed around 1000 m (6038).

Friday Harbor, Washington: Thompson et al. found 8.3 mg/l in surface waters. They also found 8.1 mg/l in offshore waters of the Pacific Ocean (6158).

San Juan Islands: Burtner found 7.66 μg/l at a chlorinity of 19‰. In the Arctic Ocean he observed an average of 7.96 μg/l at 35‰ salinity (6218).

Pacific and Indian Oceans: Sugawara and Kawasaki found 8.1 mg/l in the Western Pacific with a range of 6.8 to 9.8 mg/l. They found an average of 9.1 mg/l at the Cape of Good Hope, and an average of 8.7 mg/l in the Indian Ocean. Filtered seawater contained 7.0 to 8.8 mg Sr/l while the suspended matter filtered out represented 0.1 mg Sr/l (6206).

All Oceans: Turekian and Schutz found 7.50 (± 2.76%) mg/l (6197).

Other studies found from 5.5 mg/l in a diluted coastal water (6014) to 11.8 mg/l (6096). Most workers found around 7-8 mg/l (6002, 6124, 6074, 6015, 6018, 6111).

Biological considerations:

Sr is used primarily in the aragonitic shells of organisms (6107). Plankton show concentration factors of 8 to 3060, with most Sr in their hard parts. Marine bacteria concentrate Sr by 100 times (6000). In the Sargasso Sea, maximum Sr concentrations are found near the permanent thermocline (6111).

Geochemical considerations:

The Columbia River contianed 30, 112, and 60 μg Sr/l at three different times of year (6249). Kopp and Kroner found an average of 58 μg/l in filtered (< 0.45 μ) samples (6251). Three Caribbean rivers are very low in Sr relative to seawater. There was no particulate Sr in these rivers (6110). Sr is not adsorbed readily by soils (6000). No land drainage effect except in directly affected waters (6002). May be solubility controlled (6102).

Industrial sources:

Sr is used in alloys, in pyrotechnics, in refining beet sugar, in manufacturing glass and paints, in ceramics, and in some medicines (6000).

STRONTIUM continued

Analytical considerations:

Immediate filtering recommended due to the solubility of some of the particulate Sr (6111). Storage in polyethylene is preferred (6014, 6111). Billings and Harriss found no differences between "acidized and non-acidized," and between filtered and unfiltered samples (6014).

Conclusions:

The strontium concentration of the oceans is about 8 mg/l with local variations.

TANTALUM

Physcio-chemical form:

Observed distributions:

Unspecified: Hamaguchi et al. found less than 0.02 µg/l (6066).

Biological considerations:

Geochemical considerations:

Industrial sources:

Analytical considerations:

"known to be adsorbed quickly on most surfaces..." (6141).

Conclusions:

None.

THALLIUM

Physico-chemical form:

Tl^{+1} in solution. May be adsorbed by clay minerals (6144). Strongly complexed by chloride (6020, 6144).

THALLIUM continued

Observed distributions:

Gullmarsfjord: Noddack and Noddack found less than 0.01 μg/l (6121).

Unspecified: Shaw found less than 0.02 μg/l in seawater, and by analogy to Rubidium, estimated 0.002 μg/l (6144).

Biological considerations:

Organisms have a significant effect on thallium distributions (6114). Tl has been detected in kelp (6075), and in marine invertebrates which show an estimated concentration factor of 100 over seawater (6074).

Geochemical considerations:

Adsorbed on clays. Most is removed near the coast (6144).

Industrial sources:

Used as a poison for small animals (6098).

Analytical considerations:

Although no data exists relative to Tl^+, its geochemical similarity to K^+ and Rb^+ (6144) suggests that filtered samples can be stored without significant effect on the thallium concentration.

Conclusions:

The concentration of thallium in seawater is less than 0.01 μg/l.

TIN

Physico-chemical form:

Possibly Sn^{2+}, complexed by chloride (6020). Probably $SnCl^+$ or $SnCl_3^-$ (6179).

TIN continued

Observed distributions:

Pacific Ocean: Hamaguchi et al. found an average value of 0.81 µg/l for 4 samples taken at 30°N and 139°30'E to 147°30'E from 500 m. The range of values was from 0.30 µg/l to 1.22 µg/l (6067).

English Channel: Black and Mitchell found less than 5 µg/l (6015).

Gullmarsfjord: Noddack and Noddack found 3 µg/l (6121).

Biological considerations:

Trace amounts are beneficial to fish (6000). Marine animals average 1.7 ppm content. Marine organisms have enrichment factors around 2400 (6067).

Geochemical considerations:

The Columbia River had less than 1 µg/l in 30/31 samples over a four-year period (6103). Tin is not enriched in any environment over any other (6067).

Industrial sources:

Tin is used as a mordant for reviving colors, dyeing of fabrics, weighting of silks, and tinning of vessels. Tin chromate is used in decorating porcelain. Tin oxide is used in glass works, dyes and houses, and in fingernail polishes. Tin sulfide is used in laquers and varnishes, in fungicides, insecticides and antihelminthics (6000).

Analytical considerations:

Conclusions:

Tin concentrations in the oceans are probably around 1 µg/l.

TITANIUM

Physico-chemical form:

From the chemical similarity to silicon, one expects H_4TiO_4 (6062). However, the actual species may be $TiO_2 \cdot 2H_2O$ in this case (6179).

Observed distributions:

Washington Coast: Griel and Robinson found 1-2 μg/l at 47°44'30"N, 122°25'30"W (6062).

English Channel: Black and Mitchell found 8 and 9 μg/l 20 miles offshore in February and 6 μg/l one-half mile offshore in June (6015).

Gullmarsfjord: Noddack and Noddack found <0.5 μg/l (6121).

Biological considerations:

Ti is found in range from 0.0021 to 0.032% in diatoms (6062). Concentration factors for six brown algae range from 200 to 10,000 (6000). 3.37 to 33.7 μg/l Ti were found in the water accompanying a bloom of Gymnodinium brevis off Florida, and thought to be due to biological concentration (6041).

Geochemical considerations:

The Columbia River contained 2.9, 5.2, and 2.1 Ug Ti/l at three different times of year (6249).

Industrial sources:

Manufacture of TiO_2 and Ti pigments, and use by paper mills of TiO_2 as a "filler" create Ti wastes (6098). Ti is used in alloys, paint pigments, as a mordant in the dyeing industry, in electronics manufacturing, and in the glass and ceramic industries (6000).

Analytical considerations:

Conclusions:

The sea water concentration of titanium may be around 1 μg/l, and may be considerably influenced by land drainage.

TUNGSTEN

Physico-chemical form:

Anionic (6102). WO_4^{--} (6059).

Observed distributions:

Pacific Ocean, Japan: Ishibashi and Ishibashi *et al.* found 0.09 to 0.10 μg/l (6077) and 0.12 μg/l offshore (6087).

Biological considerations:

Seawater concentration "possibly" controlled by organic reactions (6102).

Geochemical considerations:

Ca, Mg, and Fe salts are "insoluble" (6000). W is very effectively removed from seawater (6102).

Industrial sources:

W is used in metallurgy, in filaments for incandescent lights, as a plating material, for fireproofing and waterproofing fabrics, in pigment production, and in phonograph needles (6000).

Analytical considerations:

Conclusions:

Sea water may contain about 0.1 μg/l of tungsten.

VANADIUM

Physico-chemical form:

"still in some doubt" (6117). Chiefly $H_2VO_4^-$, but perhaps some $H_3V_2O_7^-$ (6102). $VO_2(OH)_3^{--}$ (6059).

VANADIUM continued

Observed distributions:

Pacific Ocean, Japan: Ishibashi and Ishibashi et al. found 2.6 to 4.6 μg/l (6077) and 3 to 4 μg/l in offshore areas (6089)

English Cannel: Morr[illegible] found 0.86 ± 0.14 μg/l (6117). Samples were filtered. Black [illegible] Mitchell found 2.4 and 2.7 μg/l 20 miles offshore in February and 5 and 7 μg/l one-half mile offshore in June (6015).

Irish Sea: Chan and Riley found 1.82 ± 0.05 μg/l. Samples were filtered (6029).

Black Sea: Zhavoronkina found 0.63 μg/l (6178) in surface waters.

Unspecified: Ernst and Hormann found 0.2 to 0.4 μg/l (6049).

Gullmarsfjord: Noddack and Noddack found less than 0.3 μg/l (6121).

Biological considerations:

"possible that vanadium is an essential micronutrient for all green plants" (6000). Organo-vanadium compounds are found in Ascidians and Tunicates and seaweeds (6029). Vanadium is removed from seawater into the biosphere (6021). V is one of the elements showing greatest enrichment in organic sediments (6102). Bio[illegible]ous V was about equal to lithogeneous in a stagnant fjord (6185).

Geochemical considerations:

30/31 samples taken in the Columbia River over a four-year period had less than 2 μg/l (6103). V is very effectively removed from seawater (6102).

Industrial sources:

V is used in metallurgy, glass manufacturing, photography, and dyeing and printing fabrics (6000).

VANADIUM continued

Analytical considerations:

Filtration is recommended (6117). No losses were observed in filtered samples stored in the dark for 16 days in pyrex or high density polyethylene. There was a 3% loss on soda glass bottles (6029).

Conclusions:

Vanadium concentrations in sea water may be around 1 μg/l.

YTTRIUM

Physico-chemical form:

Behaves somewhat like Al, $[Y(OH)_3]$ (6075). Mainly particulate (6061) but this data is questioned as being a non-equilibrium observation.

Observed distributions:

Unspecified: 0.3 μg/l (6075).

Central Atlantic: Hogdahl et al. found 0.0133 μg/l in North Atlantic deep water (6147).

Biological considerations:

Most marine organisms have concentration factors around unity. Corals have quite high Y concentrations (6075).

Geochemical considerations:

Analytical considerations:

Filtration recommended (see Physico-chemical form).

Conclusions:

Sea water concentration of yttrium may be around 0.01 μg/l.

ZINC

Physico-chemical form:

"...predominantly in the free, divalent, cationic form" (6117). Some $ZnCl^+$ (6102), $ZnSO_4^0$ (6059). Organic complexes are indicated (6137, 6275). Associated with filterable particulate matter (6011). Baric and Branica determined Zn^{++} and $ZnOH^+$ as the chief species (6099).

Observed distributions:

Northeast Pacific Ocean: Buffo found averages of 22 μg/l at the surface, 15 μg/l at 10 m, 12 μg/l at 20 m, 10 μg/l at 50 m, 10 μg/l at 100 m, 7.7 μg/l at 150 m, and 7.1 μg/l at 300 m. Samples are thought to have been contaminated by the sampling apparatus (6175).

Atlantic and Pacific Oceans: Fabricand _et al_. found 0.59 to 0.72 μg/l in unfiltered samples from 500 to 1600 ft. in the Atlantic. At 32°40'N, 117°36'W, they found 0.60 μg/l in surface waters (6050).

Japan, Coastal: Morita found 2,8 to 11.7 μg/l (ave. 5.6 μg/l) in Tokyo and Ise Bays and Misaki Channel (6114). Values in Sagami and Suruga Bays tended to increase with depth. In the Kuroshio in May, they found 1.3 and 1.5 μg/l (6155, 6116).

Pacific Ocean; New Zealand: Brooks found surface values averaging 39 μg/l. Samples were filtered and oxidized (6189).

Other investigators found from 3 to 25 μg/l zinc (6224, 6177, 6117, 6015, 6188, 6121, and 6012).

Biological considerations:

"Many biological functions" concentrate Zn in organisms (6137). Concentrations of 150,000 μg/l are found in marine plants and 1,500,000 μg/l in marine animals (6004). Shellfish concentrate Zn up to 100,000 times (6000). See also Rice (6230).

Geochemical considerations:

A mean value for samples from the Columbia River is 22 μg/l (6251). Values higher than oceanic values have been noted in Japanese bays

(6116) in closed basins of the Gulf Coast (6137) and in an enclosed "seawater lake" (6177). Three Caribbean rivers gave values 1 to 5 times oceanic values of dissolved ($< 0.45\ \mu$) Zn, but particulate Zn runs up to 30 times oceanic soluble Zn values (6110). Two or three hours after mixing filtered sea and river waters, almost all Zn had precipitated (6110). Zn is "strongly" and permanently adsorbed on silt (6000).

Industrial sources:

Zinc from zinc mine wastes, factories making Zn compounds, zinc plating wastes, galvanizing wastes, viscose rayon wastes, and rubber manufacturing wastes (6098). Zn is used in alloys, for electrical purposes, in printing plates, in dye manufacturing and dyeing processes, in paint pigments, cosmetics, pharmaceutics, and insecticides. The chloride is used in deodorants, disinfectants, embalming materials, and in manufacture of paper, dye and glues. The sulfate is used in calico printing, wood and skin preservation, and for electroplating (6000).

Analytical considerations:

Samples should be filtered. Storage in pyrex for two years produced no data anomalies (6141).

Conclusions:

Zinc concentrations in sea water vary widely around 10 μg/l.

ZIRCONIUM

Physico-chemical form:

Zr probably exists as ZrO^{2+} in aqueous solution (6179). The carbonate, hydroxide, oxide, and silicate of Zr (IV) are highly insoluble (6000). "Essentially particulate" "insoluble hydrated oxides" (6061), but this may not be the state in natural seawater. Formation of colloids, extensive hydrolysis, and polymerization complicate behavior. Strongly coprecipitated and adsorbed (6226).

Observed distributions:

Pacific Ocean: Shigematsu and coworkers found 0.011 to 0.041 µg Zr/l in seawater near Japan (6145).

Biological considerations:

Zr apparently has "relatively little biological significance in the sea." Particulate fallout Zr^{95} is concentrated only by second trophic level animals, i.e., some copepods, euphausiids, pteropods, and salps (6226, 6183). Concentration factors are 1×10^3 for algae, 1.5×10 for invertebrates (6001), and about 2500 to 10,000 for "shells and seaweeds" based on the ash weight (6145). Marine plants contain up to 20 ppm Zr (s.w. = 0.000022 ppm). Zr is accumulated by plankton. Marine animals contain from 0.1 to 1 ppm (6019). Concentrations between 0.34 and 3.4 mg Zr/l were recorded during a bloom of Gynodinium off Florida. These Zr values were not drainage affected, and are thought to be Zr "concentrated by the organisms of the mass bloom." Samples were not, evidently, filtered (6041).

Geochemical considerations:

Industrial sources:

Zr is used in metallurgy, electronics manufacturing, as shielding for nuclear reactors, in tanneries, as a pigment in plastics, and in the ceramic and glass industries (6000).

Analytical considerations:

Adheres to glassware (6226).

Conclusions:

Zirconium concentrations may be around 0.1 to 0.4 µg/l.

The Toxicity of Trace Metals Toward Marine Species

This study brings together literature on the toxicity of trace metals toward specific marine organisms. Information from reviews by Doudoroff and Katz (6235) and McKee and Wolf (6000) was supplemented with a search of the literature up to the present.

The data are presented as follows:

Generic name	specific name	(common name)	reference number
concentration of toxicant	effect on the organism, TL_m, killed, etc.	duration of exposure	other pertinent factors

In addition to the elements for which data are presented, the search covered the elements:

- Antimony
- Beryllium
- Bismuth
- Cesium
- Gallium
- Germanium
- Gold
- Hafnium
- Indium
- Irridium
- Niobium
- Osmium
- Palladium
- Platinum
- Polonium
- Rhenium
- Rhodium
- Rubidium
- Ruthenium
- Scandium
- Selenium
- Tantalum
- Technecium
- Tellurium
- Thallium
- Titanium
- Vanadium
- Yttrium
- Zirconium

The data are presented alphabetically by element, and alphabetically by species name within each element.

ALUMINUM

__________ __________ (bacteria)			6207
132 ppm	wiped out	96 hours	$AlCi_3$
44 ppm	50% mortality	72 hours	$AlCl_3$
Crassostrea virginica (oyster)			6207
88 ppm	not toxic	11 days	$AlCl_3$
Cynoscion nebulosus (speckled trout)			6207
44 ppm	not toxic	14 days	$AlCl_3$
Cyprinodon variegatus (sheepshead minnow)			6207
44 ppm	not toxic	11 days	$AlCl_3$
Fundulus grandis (grand killifish)			6207
88 ppm	not toxic	11 days	$AlCl_3$
Fundulus similis (Gulf killifish)			6207
44 ppm	not toxic	11 days	$AlCl_3$
Mugil cephalus (mullet)			6207
88 ppm	toxic	1 day	$AlCl_3$
Penaeus setiferus (shrimp)			6207
44 ppm	probably not toxic	21 days	$AlCl_3$
Sciaenops ocellatus (redfish)			6207
44 ppm	not toxic	11 days	$AlCl_3$

ARSENIC

__________ __________ (pink salmon)			6004
5.3 mg/l	"extremely harmful"	8 days	As_2O_3

BARIUM

__________ __________ (fish)			6235
780 mg/l	tolerance limit	48 hours	$BaCl_2$

CADMIUM

____________ ____________ (fish)			6235
17 mg/l	tolerance limit	48 hours	$CdCl_2$
Crassostrea virginica (Eastern oyster)			6004
0.2 mg/l	TL_m	8 week	$Cd(NO_3)_2$
0.1 mg/l	TL_m	15 week	$Cd(NO_3)_2$
Fundulus heteroclitus (mummichog)			6235
--	"highly toxic"	--	--
Mya arenaria (soft-shell clam)			6131
0.1 ppm	apparently not toxic	56 days	--

CHLORINE

____________ ____________ (anemones)			6243
10 ppm	killed	4 days	--
2.5 ppm	killed	8 days	--
1 ppm	all alive	15 days	--
____________ ____________ (barnacles)			6243
10 ppm	killed	3 days	--
2.5 ppm	killed	4 days	--
1 ppm	a few survivors	15 days	--
____________ ____________ (clams)			6000
0.3-0.5 mg/l	no effect (packing procedure)	24 hours	--
____________ ____________ (fouling animals)			6250
1 mg/l	slowly kills		
____________ ____________ (marine fish)			6000
1 mg/l	slight irritant activity	--	--
10 mg/l	violent irritant activity	--	--
Botryllus sp. (tunicate)			6243
10 ppm	killed	1 day	--

CHLORINE continued

Bugula sp. (bryozoan)			6243
10 ppm	killed	1 day	--
2.5 ppm	killed	2 days	--
Crassostrea virginica (oysters)			6000
0.01-0.05 mg/l	pumping activity reduced		--
1 mg/l	effective pumping impossible		--
Elminius modestus (barnacle nauplii)			6268
2 ppm	majority killed	--	--
Macrocystis pyrifera (giant kelp)			6000
1.0 mg/l	no effect	5 days	--
5-10 mg/l	10-15% photosynthesis reduction	2 days	--
5-10 mg/l	50-70% photosynthesis reduction	5-7 days	--
Molgula sp. (ascidian)			6243
10 ppm	killed	1 day	--
2.5 ppm	killed	1 day	--
1 ppm	killed	3 days	--
Mytilus edulis (adult mussels)			6243
10 ppm	killed	5 days	--
2.5 ppm	killed	5 days	--
1 ppm	killed	15 days	--
Ostrea edulis (oyster larvae)			6268
10 ppm	unharmed	--	--

CHROMIUM

____________ ____________ (oyster)			6004
10-12 µg/l	some mortality	2 years	--
Carcinus maenas (shore crab)			6203
40-60 ppm	threshold	12 days	$CrO_4^=$
Fundulus heteroclitus (mummichog)			6235
200 ppm	non-toxic	1 week or longer	$K_2Cr_2O_7$

CHROMIUM continued

Leander squilla (prawn, small)			6203
5 ppm	threshold	12 days	Cr^{+6}
Macrocystis pyrifera (giant kelp)			6000
1 mg/l	photosynthesis diminished 10-20%	5 days	$K_2Cr_2O_7$
Nereis virens (polychaete worm)			6203
1 ppm	threshold	5 weeks	Cr^{+6}
Nereis virens (polychaete worm)			6004
0.2 mg/l	similar to controls	20 weeks	$Cr_2O_7^{=}$

COBALT

______ ______ (fish)			6235
125 mg/l	tolerance limit	48 hours	$CoCl_2$
Fundulus heteroclitus (mummichog)			6235
200 ppm	non-toxic	--	$CoCl_2$

COPPER

______ ______ (algae, green)			6019
0.01 ppm	lethal	--	--
______ ______ (bacteria, marine)			6262
1.3 mg Cu/l	inhibited growth of 1.4% of organisms	--	--
______ ______ (fish, marine)			6000
0.56 mg Cu/l	"minimum lethal concentration"		$CuNO_3$
______ ______ (fouling animals)			6250
6-7 mg/l	kills	--	$CuSO_4$
______ ______ (fish, marine)			6235
3.3 mg/l	tolerance limit	48 hours	--

COPPER continued

____________ ____________ (oysters)			6000
0.1-0.5 mg/l	toxic	--	--
____________ ____________ (oysters)			6000
0.13-0.5 mg/l	unfit as food for humans	--	--
____________ ____________ (oysters)			6257
1.0 ppm	no mortalities	96 hours	--
1.9 ppm	TL_m	96 hours	--
Acartia clausi (copepod)			6241
0.5 mg Cu/l	50% mortality	13 hours	Citrate
Acmaea scabra var. *limatula* (mollusk)			6255
0.10 ppm	lethal	3 days	--
Artemia salina (brine shrimp larvae)			6241
100 mg/l	50% kill	92 hours	Citrate
Astraea undosa (mollusk)			6255
0.05 ppm	100% mortality	14 days	--
Balanus balanoides (adult barnacles)			6238
0.42 mg/l	lethal	2 days	$CuCO_3$
Balanus balanoides (adult barnacles)			6238
Balanus eburneus			
0.06 mg/l	not toxic	2 weeks or more	Citrate
Balanus crenatus (adult barnacles)			6236
Balanus balanoides			
10 mg/l	killed	2 hours	$CuSO_4$
Balanus crenatus (barnacle nauplii)			6236
Balanus balanoides			
30 mg/l	killed	2 hours	$CuSO_4$
Balanus eburneus (barnacle nauplii)			6238
0.06 mg/l	lethal	22 hours	Citrate

COPPER continued

Balanus eburneus (adult barnacles)			6238
0.28 mg/l	lethal	2 days	$CuCO_3$
0.14 mg/l	lethal	5 days	$CuCO_3$
0.55 mg/l	lethal	2 days	Citrate
0.14 mg/l	lethal	5 days	Citrate
0.90 mg/l	lethal	2 days	Salicylate
0.45 mg/l	lethal	5 days	Salicylate
0.50 mg/l	lethal	5 days	Para aminobenzoate
Balanus improvisus Darwin (barnacle)			6250
10 mg/l	60% lost sensitivity to stimulants 20% eventually died	3 days	$CuSO_4$
Balanus improvisus (?) (barnacle cyprids)			6238
23 mg/l	not toxic (did not interfere with metamorphosis)	--	Citrate
Bugula neritina (fouling organism)			6237
0.2 mg/l	retard growth	1 day	Cu^{++}
0.3 mg/l	kill larvae	1 day	
Bugula neritina L. (bryozoan larvae)			6247
3.81 mg Cu/l	50% mortality	2 hours	Citrate pH 7.0-8.2
Carcinus maenas (shore crab)			6203
1-2 ppm	threshold	11-12 days	--
Coccochloris elabens (phytoplankton)			6240
0.048 ppm	toxic (no growth)	8 days, 30°C	Cultured
0.027 ppm	toxic (no growth	8 days, 40°C	Static $CuSO_4$, EDTA
Cyclotella nana (phytoplankton)			6240
0.24 ppm	toxic (no growth)	8 days, 20°C	$CuSO_4$, EDTA
0.16 ppm	toxic (no growth)	8 days, 30°C	Cultured Static Bacterially contaminated

COPPER continued

Dunaliella tertiolecta (phytoplankton)			6240
0.50 ppm	toxic (no growth)	8 days	35°C cultured, Static $CuSO_4$, EDTA
Elminius modestus (barnacle larvae)			6241
10 mg/l	50% kill	24 hours	Citrate
Exuviaella sp. (phytoplankton)			6240
0.045 ppm	toxic (no growth)	8 days, 20°C	Cultured
0.026 ppm	toxic (no growth)	8 days, 30°C	Static $CuSO_4$, EDTA Bacterially contaminated
Fundulus heteroclitus (mummichog)			6235
30 ppm	tolerated	4 days	$CuSO_4$
Fusinus kobelti (mollusk)			6255
0.20 ppm	100% mortality	8 days	--
0.10 ppm	less than 100% mortality	60 days	--
Galeolaria caespitosa Lamarck (tubeworm larvae)			6247
2.86 mg Cu/l	50% mortality	2 hours	Citrate pH 7.0-8.2
Glenodinium foliaceum (phytoplankton)			6240
0.052 ppm	toxic (no growth)	8 days, 20°C	Cultured
0.031 ppm	toxic (no growth)	8 days, 30°C	Static $CuSO_4$, EDTA Bacterially contaminated
Glenodinium sp. (phytoplankton)			6240
0.048 ppm	toxic (no growth)	8 days, 20°C	Cultured
0.029 ppm	toxic (no growth)	8 days, 30°C	Static $CuSO_4$, EDTA
Gymnodinium breve (dinoflagellate)			6240
0.05 ppm	toxic	--	--

COPPER continued

Gymnodinium breve (plankton)			6252
30 ppb	min. lethal	--	--
Gymnodinium brevis (algae, red-tide organisms)			6262
0.1 mg Cu/l	lethal	--	--
Haliotis fulgens (mollusk)			6255
0.10 ppm	100% mortality	3 days	--
0.05 ppm	less than 100% mortality	[illegible] days	--
Ischnochiton conspicuus (mollusk)			6255
0.15 ppm	100% mortality	10 days	--
0.10 ppm	less than 100% mortality	60 days	--
Leander squilla (prawn, small)			6203
0.5 ppm	threshold	21 days	--
Littorina irrorata (snail)			6252
510 µg/l	tolerate with "temporary minor discomfort"	--	--
Macrocystis pyrifera (giant kelp)			6000
0.1 mg/l	visible injury	10 days	$CuSO_4$, $CuCl_2$
0.1 mg/l	50% photosynthesis inhibition	2-5 days	$CuSO_4$, $CuCl_2$
Marinogammarus marinus (amphipod crustacean)			6245
5 mg/l	not toxic	100 hours	in sea water
Mercierella enigmatica (polychaete)			6000
0.32 mg/l	"significant response"	--	$CuSO_4$
Mya arenaria (soft-shell clam)			6131
0.02 ppm	least toxic conc. studied	8 days	--
Mytilus californianus (mussel)			6255
0.20 ppm	100% mortality	2 days	--
0.15 ppm	less than 100% mortality	30 days	--
0.10 ppm	less than 100% mortality	60 days	--

COPPER continued

Mytilus edulis (mussel)			6238
0.55 mg/l	killed	12 hours	Citrate
0.14 mg/l	killed	1 day	Citrate
0.08 mg/l	killed	2 days	Citrate
0.04 mg/l	some mortality	3 days	Citrate
0.02 mg/l	no mortality	4 days	Citrate
Mytilus edulis (mussel)			6255
0.20 ppm	100% mortality	17 days	--
0.10 ppm	less than 100% mortality	35 days	--
Mytilus edulis (mussel)		6000	
0.32 mg/l	"significant response"	--	CuSO$_4$
Mytilus edulis planulatus Lamarck (bivalve mollusc larvae)			6247
22.2 mg Cu/l	50% mortality	2 hours	Citrate pH 7.0-8.2
Neosphaeroma oregonensis (isopod)			6000
0.02 mg/l	"significant response"	--	CuSO$_4$
Nereis virens (polychaete worm)			6203
0.1 ppm	threshold	21 days	--
Nitocra spinipes (harpactacid copepod)			6246
26 mg Cu/l	42.5% mortality	24 hours	CuSO$_4$
Nitzschia closterium (phytoplankton)			6240
0.20 ppm	toxic (no growth)	8 days, 20°C	CuSO$_4$
0.14 ppm	toxic (no growth)	8 days, 30°C	EDTA Cultured Static
Paphia staminea var. laciniata (mollusk)			6255
1 ppm	non lethal	30 days	--
3 ppm	∿50% lethal	∿60 days	--
Perigonimus megas Kinne (hydroid)			6250
10 mg Cu/l	100% fatal	1 day	CuSO$_4$
1 mg Cu/l	98% fatal	2 days	CuSO$_4$

COPPER continued

Prorocentrum sp. (plankton)			6252
26 μg/l	60% mortality	<1 day	in the field
Pseudomomas aetuginosa (bacteria)			6253
23 g/l	lethal	--	$CuCl_2$
Skeletonema costatum (phytoplankton)			6240
0.26 ppm	toxic (no growth)	8 days, 20°C	$CuSO_4$, EDTA,
0.17 ppm	toxic (no growth)	8 days, 30°C	Cultured, Static, Bacterially contaminated.
Spirorbis lamellosa Lamarck (tubeworm larvae)			6247
0.51 mg/l	50% mortality	2 hours	Citrate pH 7.0-8.2
Staphlococcus aureus (bacteria)			6253
18 g/l	lethal	--	$CuCl_2$
Tegula gallina (mollusk)			6255
0.10 ppm	100% mortality	15 days	--
0.05 ppm	less than 100% mortality	60 days	--
Tegula viridula var. ligulata (mollusk)			6255
0.10 ppm	100% mortality	25 days	--
0.05 ppm	less than 100% mortality	60 days	--
Thallassiosira fluviatilis (phytoplankton)			6240
0.28 ppm	toxic (no growth)	8 days, 20°C	$CuSO_4$, EDTA,
0.18 ppm	toxic (no growth)	8 days, 30°C	Cultured, Static.
Watersipora cucullata Busk (bryozoan larvae)			6247
0.57 mg Cu/l	50% mortality	2 hours	Citrate pH 7.0-8.2

IRON

____________ ____________ (fish)			6235
14 mg/l	tolerance limit	48 hours	$Fe^{+++} Cl^{-}$

IRON continued

Fundulus heteroclitus (killifish)			6235
200 ppm	non-toxic	1-2 weeks	ferric ammonium citrate

LEAD

Crassostrea virginica (Eastern oyster)			6131
0.2 ppm	not toxic	49 days	--
Crassostrea virginica (Eastern oyster)			
0.5 mg/l	TL_m	12 weeks	$PbCl_2$
0.3 mg/l	TL_m	18 weeks	$PbCl_2$
0.1-0.2 mg/l	noticeable tissue changes	12 weeks	$PbCl_2$
Macrocystis pyrifera (giant kelp)			6000
4.1 mg/l	no deleterious effects on rate of photosynthesis	4 days	--
Mya arenaria (soft-shell clam)			6131
0.2 ppm	apparently not toxic	84 days	--
Pleuronectes platessa (plaice, embryos)			6235
4 ppm	no effect	--	--
Psammechinus miliavis (sea urchin)			6000
200 mg/l	egg abnormalities	--	$Pb(NO_3)_2$

LITHIUM

______ ______ (fish)			6235
300 mg/l	tolerance limit	48 hours	LiCl

MANGANESE

______ ______ (fish)			6235
300 mg/l	limit of tolerance	48 hours	$MnCl_2$
Fundulus heteroclitus (killifish)			6235
200 ppm	non-toxic	1-2 weeks	$MnCl_2$

MERCURY

__________ __________ (bivalve larvae)			6000
0.02 mg/l	lethal	--	$HgCl_2$
__________ __________ (marine fish)			6235
0.29 mg/l	tolerance limit	48 hours	$HgCl_2$
__________ __________ (fish)			6235
as Cl^- increases, toxicity decreases		--	$HgCl_2$
__________ __________ (phytoplankton)			6000
0.9-60 mg/l	min. lethal conc.	--	Hg^{++}
Acartia clausi (copepod)			6241
0.05 mg/l	50% mortality	2.5 hours	$HgCl_2$
0.05 mg/l	50% mortality	2.3 hours	HgI_2
Artemia salina (brine shrimp larvae)			6241
20 mg/l	50% mortality	57 hours	$HgCl_2$
3 mg/l	50% mortality	13 hours	HgI_2
Artemia salina L. (brine shrimp larvae)			6247
1810 mg/l	50% mortality	2 hours	$HgCl_2$ pH 7.8-8.2
Balanus balanoides (adult barnacle)			6238
1.0 mg/l	lethal	2 days	$HgCl_2$
0.5 mg/l	lethal	5 days	$HgCl_2$
Balanus improvisus (?) (cyprid barnacles)			6238
3.3 mg/l	did not interfere with metamorphosis	--	$HgCl_2$
Bugula neritina L. (bryozoan larvae)			6247
0.2 mg Hg/l	50% mortality	2 hours	$HgCl_2$ pH 7.8-8.2
Crassostrea commercialis Iredale and Roughley (bivalve mollusk larvae)			6247
181 mg Hg/l	50% mortality	2 hours	$HgCl_2$ pH 7.8-8.2

MERCURY continued

Elminius modestus (barnacle larvae)			6241
1.5 mg Hg/l	50% mortality	6 hours	$HgCl_2$
1.5 mg Hg/l	50% mortality	3.2 hours	HgI_2
Galeolaria caespitosa Lamarck (tubeworm larvae)			6247
1.2 mg Hg/l	50% mortality	2 hours	$HgCl_2$ pH 7.8-8.2
Macrocystis pyrifera (giant kelp)			6000
0.05 mg Hg/l	50% photosynthesis decrease	4 days	$HgCl_2$
0.1 mg Hg/l	15% photosynthesis decrease	1 day	$HgCl_2$
0.1 mg Hg/l	inactivation	4 days	$HgCl_2$
Marinogammarus marinus (amphipod crustacean)			6245
15 mg/l	mean activity time	12 hours	$HgCl_2$
5 mg/l	mean activity time	85 hours	$HgCl_2$
Mytilus edulis planulatus Lamarck (bivalve mollusc larvae)			6247
13.1 mg Hg/l	50% mortality	2 hours	$HgCl_2$ pH 7.8-8.2
Nitocra spinipes (harpactacid copepod)			6246
0.60 mg Hg/l	50% mortality	24 hours	$HgCl_2$
4.4 mg Hg/l	100% mortality	24 hours	$HgCl_2$
Spirorbis lamellosa Lamarck (tubeworm larvae)			6247
0.14 mg Hg/l	50% mortality	2 hours	$HgCl_2$ pH 7.8-8.2
Watersipora cucullata (Busk) (bryozoan larvae)			6247
0.1 mg Hg/l	50% mortality	2 hours	$HgCl_2$ pH 7.8-8.2

MOLYBDENUM

___________ ___________ (oysters)			6004
0.010-0.012 mg/l	some mortality	2 years	--

NICKEL

____________ ____________ (fish)			6235
125 mg/l	tolerance limit	48 hours	$NiCl_2$
____________ ____________ (oysters)			6004
0.121 mg/l	considerable mortality	long term	Ni^{++}
____________ ____________ (oysters)			6004
0.010-0.012 mg/l	some mortality	2 years	--
Fundulus heteroclitus (killifish) (mummichog)			6235
100 ppm Ni	tolerated	2 weeks	$NiCl_2$
200 ppm Ni	tolerated	1-2 weeks	$NiCl_2$
Macrocystis pyrifera (giant kelp)			6000
1.31 mg Zn/l	no effect	--	$ZnSO_4$
13.1 mg Zn/l	50% photosynthesis reduction	4 days	$ZnSO_4$

SILVER

Balanus balanoides (adult barnacles)			6238
0.4 mg/l	lethal	2 days	Ag_2SO_4
0.2 mg/l	lethal	5 days	Ag_2SO_4

STRONTIUM

____________ ____________ (fish)			6235
1500 mg/l	tolerance limit	48 hours	$SrCl_2$

TIN

____________ ____________ (green algae)			6019
0.002 ppm	lethal	--	Sn^{++}

ZINC

___________ ___________ (marine fish)			6235
8.4 mg/l	tolerance limit	48 hours	$ZnCl_2$
Balanus balanoides (adult barnacles)			6238
32 mg/l	lethal	2 days	$Zn(NO_3)_2$
8 mg/l	lethal	5 days	$Zn(NO_3)_2$
Balanus improvisus Darwin (barnacle)			6250
10 mg/l	70% kill	5 days	ZnO
Bugula neritina L. (bryozoan larvae)			6247
5.2 mg Zn/l	50% mortality	2 hours	Citrate pH 7.6-8.0
Fundulus heteroclitus (killifish)			6235
200 ppm	non-toxic	1-2 weeks	$ZnSO_4$
Macrocystis pyrifera (giant kelp)			6000
1.31 mg Zn/l	no effect	4 days	$ZnSO_4$
10 mg Zn/l	50% "inactivation"	4 days	$ZnSO_4$
Nitzschia sp. (diatom)			6224
0.25 mg/l	reduction of division rate	--	$ZnSO_4$
Perigonimus megas Kinne (hydroid)			6250
10 mg/l	93% fatal	3 days	ZnO
Perigonimus megas Kinne (hydroid)			6250
20 mg/l	fatal	1 day	1/2 salicylamide
10 mg/l	36% fatal	3 days	1/2 cichloro-salicylamide
Psammechinus miliavis (sea urchins)			6000
0.16 mg/l	egg abnormalities	--	$ZnSO_4$
Spirorbis lamellosa Lamarck (tubeworm larvae)			6247
4.9 mg Zn/l	50% mortality	2 hours	Citrate pH 7.6-8.0
Watersipora cucullata Busk (bryozoan larvae)			6247
32.6 mg Zn/l	50% mortality	2 hours	Citrate pH 7.6-8.0

APPENDIX 5. PESTICIDE TOXICITIES

by Stephen W. Hager

Toxicities of Pesticides to Marine Organisms

Toxic levels of some common pesticides (insecticides) to marine organisms are presented in the following tables. These tables are by no means complete. The reader is referred to studies by Butler (6044), Eisler (6048), and Ukeles (6101) for the effects of some less well-known pesticides, and to the review by Johnson (6072) on the effects of pesticides on fishes.

Use of the data presented here is complicated by several factors. Differences in the toxicities of similar compounds to one species, and differences in the susceptibilities of similar species to a certain compound make generalization difficult (6072). In addition, problems in methodology, particularly those relating to application of water-soluble insecticides, make intercomparisons of studies doubtful (6101). Finally, the inapplicability of laboratory data to the field has been demonstrated (6072).

Data are presented for the chlorinated hydrocarbons, Aldrin, DDT, Dieldrin, Endrin, Heptachlor, Lindane, Methoxychlor, Sevin (and 1-Napthol,its breakdown product), and Toxaphene, and for the organophosphate insecticides Malathion, Methyl parathion, Parathion, and Phosdrin. Species are arranged alphabetically under each insecticide heading.

The form of the data is as follows:

Generic name	specific name	(common name)	reference number
concentration of toxicant	effect on the organism; TL_m, killed, etc.	duration of exposure	other pertinent factors

	Page
Aldrin	101
DDT	101
Dieldrin	103
Endrin	104
Heptachlor	104
Lindane	105
Methoxychlor	105
Sevin	106
1-Naphthol	107
Toxaphene	108
Malathion	108
Methyl Parathion	109
Parathion	109
Phosdrin^R	110

ALDRIN

Crangon septemspinosa Say (sand shrimp)			6048
8μg/l	LC_{50}	96 hours	24‰sal. 20°C
Crassostrea virginica (oyster)			6044
0.025 mg/l	50% decrease in shell growth	96 hours	27‰sal. 30°C
Crassostrea virginica (oyster)			6044
0.055 mg/l	EC50 50% decrease in shell growth	96 hours	19‰sal. 11°C
Leiostomus xanthurus (juvenile spot)			6044
0.0055 mg/l	EC_{50}	48 hours	28‰sal. 24°C
Pagurus longicarpus Say (hermit crab)			6048
33μg/l	LC_{50}	96 hours	24‰sal. 20°C
Palaemonetes vulgaris Say (grass shrimp)			6048
9 μg/l	LC_{50}	96 hours	24‰sal. 20°C

DDT

____________ ____________ ("typical neritic phytoplankton community")			6057
10 ppb	ca. 40% photosynthesis inhibition	24 hours	ethanolic solution
____________ ____________ (oyster larvae)			6085
0.025 mg/l	interferred with growth	----	----
1.0 mg/l	lethal	4 days	----
Artemia salina (Leach) (brine shrimp)			6081
0.012 mg/l	TL_m	5 hours	larvae 27.5°C
0.142 mg/l	TL_m	5 hours	adults 27.5°C
Balanus improvisus Darwin (barnacle)			6250
100 mg/l	100% mortality	4 days	----
Chlorella sp. (plankton)			6101
1.00 ppm	no growth inhibition	10 days	colloidal solution

DDT continued

Coccolithus huxleyi (coccolithophore)			6057
10 ppb	ca. 25% photosynthesis inhibition	24 hours	ethanolic solution
Crangon septemspinosa Say (sand shrimp)			6048
0.6 µg/l	LC$_{50}$	96 hours	p, p' -DDT 24‰sal. 20°C
Cyprinodon variegatus (juvenile sheepshead minnow)			6044
0.005 mg/l	EC$_{50}$	48 hours	25‰sal. 9°C
Dunaliella euchlora (plankton-flagellate)			6101
0.02 ppm	17% growth inhibition	10 days	colloidal solution
Leiostomus xanthurus (juvenile spot)			6044
0.002 mg/l	EC$_{50}$	48 hours	20‰sal. 12°C
Monochrysis lutheri (plankton-flagellate)			6101
0.02 ppm	43% growth inhibition	10 days	colloidal solution
Pagurus longicarpus Say (hermit crab)			6048
6 µg/l	LC$_{50}$	96 hours	p, p' -DDT 24‰sal. 20°C
Palaemonetes vulgaris Say (grass shrimp)			6048
2.0 µg/l	LC$_{50}$	96 hours	p, p' -DDT 24‰sal. 20°C
Peridinium trochoideum (dinoflagellate)			6057
10 ppb	ca. 50% photosynthesis inhibition	24 hours	ethanolic solution
Perigonimus megas Kinne (hydroid)			6250
100 mg/l	50% killed	4 days	----
Phaeodactylum tricornutum (plankton-diatom)			6101
0.04 ppm	9% growth inhibition	10 days	colloidal solution

DDT continued

Protococcus sp. (plankton)			6101
.60 ppm	50% growth inhibition	10 days	colloidal solution
Pyramimonas sp. (green alga)			6057
10 ppb	ca. 15% photosynthesis inhibition	24 hours	ethanolic solution
Skeletonema costatum (diatom)			6057
10 ppb	ca. 25% photosynthesis inhibition	24 hours	ethanolic solution

DIELDRIN

__________ __________(mullet)			6076
0.050 mg/l	100% mortality	5 hours	small
0.050 mg/l	100% mortality	24 hours	large
Artemia salina (Leach) (brine shrimp)			6081
0.595 mg/l	TL_m	5 hours	larvae
1.172 mg/l	TL_m	5 hours	adults
Crangon septemspinosa Say (sand shrimp)			6048
7 µg/l	LC_{50}	96 hours	24‰sal. 20°C
Crassostrea virginica (oyster)			6048
0.034 mg/l	50% decrease in shell growth	96 hours	25‰sal. 22°C
Crassostrea virginica (oyster)			6076
0.1 mg/l	decreased activity	2 weeks	----
Crassostrea virginica (oyster)			6048
0.44 mg/l	50% decrease in shell growth	96 hours	20‰sal. 11°C
Leiostomus xanthurus (juvenile spot)			6044
0.0055 mg/l	EC_{50}	48 hours	25‰sal. 12°C
Pagurus longicarpus Say (hermit crab)			6048
18 µg/l	LC_{50}	96 hours	24‰sal. 20°C

DIELDRIN continued

Palaemonetes vulgaris Say (grass shrimp)			6048
50 µg/l	LC_{50}	96 hours	24‰sal. 20°C

ENDRIN

Crangon septemspinosa Say (sand shrimp)			6048
1.7 µg/l	LC_{50}	96 hours	24‰sal. 20 °C
Crassostrea virginica (oyster)			6044
0.033 mg/l	50% decrease in shell growth	96 hours	22‰sal. 24°C
Crassostrea virginica (oyster)			6044
0.40 mg/l	50% decrease in shell growth	96 hours	21‰sal. 12°C
Leiostomus xanthurus (juvenile spot)			6044
0.0006 mg/l	EC_{50}	48 hours	24‰sal. 12°C
Pagurus longicarpus Say (hermit crab)			6048
12 µg/l	LC_{50}	96 hours	24‰sal. 20°C
Palaemonetes vulgaris Say (grass shrimp)			6048
1.8 µg/l	LC_{50}	96 hours	24‰sal. 20°C
Sphaeroides maculatus (puffer fish)			6258
3.1 ppb	TL_m	96 hours	24‰sal. pH8.0

HEPTACHLOR

Crangon septemspinosa Say (sand shrimp)			6048
8 µg/l	LC_{50}	96 hours	24‰sal. 20°C
Liostomus xanthurus (juvenile spot)			6044
0.025 mg/l	EC_{50}	48 hours	20‰sal. 12°C
Pagurus longicarpus Say (hermit crab)			6048
55 µg/l	LC_{50}	96 hours	24‰sal. 20°C
Palaemonetes vulgaris Say (grass shrimp)			6048
440 µg/l	LC_{50}	96 hours	24‰sal. 20°C

LINDANE

__________ __________ (crabs)			
0.2 ppm	killed	----	----
Anopheles sp. (larvae)			
0.05 ppm	100% lethal	----	----
Chlorella sp. (plankton)			6101
1 ppm	12% growth inhibition	10 days	----
Crangon septemspinosa Say (sand shrimp)			6048
5 µg/l	LC_{50}	96 hours	24‰sal. 20°C
Dunaliella euchlora (flagellate)			6101
7.5 ppm	27% growth inhibition	10 days	----
Leiostomus xanthurus (juvenile spot)			6044
0.03 mg/l	EC_{50}	48 hours	23‰sal. 15°C
Monochrysis lutheri flagellate)			6101
1 ppm	14% growth inhibition (?)	10 days	----
Pagurus longicarpus Say (hermit crab)			6048
5 µg/l	LC_{50}	96 hours	4‰sal. 20°C
Palaemonetes vulgaris Say (grass shrimp)			6048
10 µg/l	LC_{50}	96 hours	24‰sal. 20°C
Phaeodactylum tricornutum (diatom)			6101
2.5 ppm	18% growth inhibition	10 days	----
Protococcus sp. (plankton)			6101
5 ppm	25% growth inhibition	10 days	----

METHOXYCHLOR

Crangon septemspinosa Say (sand shrimp)			6048
4 µg/l	LC_{50}	96 hours	24‰sal. 20°C
Leiostomus xanthurus (juvenile spot)			6044
0.03 mg/l	EC_{50}	48 hour	26‰sal. 22°C

METHOXYCHLOR continued

Pagurus longicarpus Say (hermit crab)			6048
7 µg/l	LC$_{50}$	96 hours	24‰sal. 20°C
Palaemonetes vulgaris Say (grass shrimp)			6048
12 µg/l	LC$_{50}$	96 hours	24‰sal. 20°C

SEVIN

Callianassa californiensis (ghost shrimp)			6051
0.13 mg/l	EC$_{50}$	24 hours	----
Callianassa californiensis (ghost shrimp larvae)			6051
0.08	EC$_{50}$(lethal)	48 hours	17°C
0.03	EC$_{50}$(lethal)	48 hours	20°C
Cancer magister (juvenile Dungeness crab)			6051
0.60 mg/l	EC$_{50}$	24 hours	male
0.63 mg/l	EC$_{50}$	24 hours	female
Chlorella sp. (plankton)			6101
0.1 ppm	10% growth inhibition	10 days	----
Clinocardium nuttallii (cockle clam)			6051
7.3 mg/l	EC$_{50}$(lethal)	24 hours	----
Crassostrea gigas (Pacific oyster larvae)			6051
2.2 mg/l	50% development prevented	48 hours	----
Cymatogaster aggregata (juvenile shiner perch)			6051
3.9 mg/l	EC$_{50}$(lethal)	24 hours	----
Dunaliella euchlora (plankton-flagellate)			6101
0.1 ppm	10% growth inhibition	10 days	----
Gasterosteus aculeatus (juvenile threespine stickleback)			6051
6.7 mg/l	EC$_{50}$(lethal)	24 hours	----
Hemigrapsus oregonensis (shore crab)			6051
0.71 mg/l	EC$_{50}$	24 hours	male
0.27 mg/l	EC$_{50}$	24 hours	female

SEVIN continued

Monochrysis lutheri (plankton-flagellate)			6101
0.1 ppm	13% growth inhibition	10 days	----
Mytilus edulis (bay mussel larvae)			6051
2.3 mg/l	50% development prevented	48 hours	----
Parophrys vetulus (juvenile English sole)			6051
4.1 mg/l	EC_{50}(lethal)	24 hours	----
Phaeodactylum tricornutum (plankton-diatom)			6101
0.1 ppm	total growth inhibition	10 days	----
Protococcus sp. (plankton)			6101
0.1 ppm	20% growth inhibition	10 days	----
Upogebia pugettensis (mud shrimp)			6051
0.09 mg/l	EC_{50}(lethal)	48 hours	16°C
0.04 mg/l	EC_{50}(lethal)	48 hours	20°C

1-NAPHTHOL

Callianassa californiensis (ghost shrimp)			6051
6.6 mg/l	EC_{50}	24 hours	----
Callianassa californiensis (ghost shrimp larvae)			6051
3.5 mg/l	EC_{50}(lethal)	48 hours	17°C
3.3 mg/l	EC_{50}(lethal)	48 hours	20°C
Cancer magister (juvenile Dungeness crab)			6051
40.0	EC_{50}	24 hours	male
55.5	EC_{50}	24 hours	female
Clinocardium nuttallii			6051
6.4 mg/l	EC_{50}(lethal)	24 hours	----
Crassostrea gigas			6051
0.8 mg/l	50% development prevented	48 hours	----
Cymatogaster aggregata (juvenileshiner perch)			6051
1.3 mg/l	EC_{50}(lethal)	24 hours	----

1-NAPHTHOL continued

Gasterosteus aculeatus (juvenile threespine stickleback)			6051
3.2 mg/l	EC_{50}(lethal)	24 hours	----
Hemigrapsus oregonensis (shore crab)			6051
74.2	EC_{50}	24 hours	male
80.1	EC_{50}	24 hours	female
Mytilus edulis (bay mussel larvae)			6051
1.3 mg/l	50% development prevented	48 hours	----
Parophrys vetulus (juvenile)			6051
2.5 mg/l	EC_{50}(lethal)	24 hours	----
Upogebia pugettensis (mud shrimp)			6051
4.4 mg/l	EC_{50}(lethal)	48 hours	16°C
4.5 mg/l	EC_{50}(lethal)	48 hours	20°C

TOXAPHENE

Chlorella sp. (plankton)			6101
0.01 ppm	30% growth inhibition	10 days	60% emulsion
Dunaliella euchlora (plankton-flagellate)			6101
0.01 ppm	10% growth inhibition	10 days	60% emulsion
Leiostomus xanthurus (juvenile spot)			6044
0.001 mg/l	EC_{50}	48 hours	26‰sal. 28°C
Monochrysis lutheri (plankton-flagellate)			6101
0.000015 ppm	22% growth inhibition	10 days	60% emulsion
Phaeodactylum tricornutum (plankton-diatom)			6101
0.01 ppm	46% growth inhibition	10 days	60% emulsion
Protococcus sp. (plankton)			6101
0.04 ppm	23% growth inhibition	10 days	60% emulsion

MALATHION

Crangon septemspinosa Say (sand shrimp)			6048
33 µg/l	LC_{50}	96 hours	24‰sal. 20°C

MALATHION continued

Leiostomus xanthurus (juvenile spot) 6044
0.55 mg/l EC_{50} 48 hours 24‰sal. 19°C

Pagurus longicarpus Say (hermit crab) 6048
83 µg/l LC_{50} 96 hours 24‰sal. 20°C

Palaemonetes vulgaris Say (grass shrimp) 6048
82 µg/l LC_{50} 96 hours 24‰sal. 20°C

METHYL PARATHION

__________ __________("natural phytoplankton communities") 6044
1.0 ppm 5.1 % decrease in productivity 4 hours ----

Crangon septemspinosa Say (sand shrimp) 6048
2 µg/l LC_{50} 96 hours 24‰sal. 20°C

Crassostrea virginica (oyster) 6044
1.0 mg/l no effect 96 hours 29‰sal. 24°C

Cyprinodon variegatus (juvenile sheepshead minnow) 6044
1.0 mg/l "irritated" 48 hours 28‰sal. 24°C

Pagurus longicarpus Say (hermit crab) 6048
7 µg/l LC_{50} 96 hours 24‰sal. 20°C

Palaemonetes vulgaris Say (grass shrimp) 6048
3 µg/l LC_{50} 96 hours 24‰sal. 20°C

Penaeus aztecus (brown shrimp) 6044
0.0055 mg/l 50% loss of equilibrium 48 hours 29‰sal. 25°C

PARATHION

__________ __________("natural phytoplankton communities") 6044
1.0 ppm 9.9% decrease in productivity 4 hours ----

Crassostrea virginica (oyster) 6044
1.0 mg/l 22% decrease in shell growth 96 hours 31‰sal. 24°C

PARATHION continued

Cyprinodon variegatus (juvenile sheepshead minnow)			6044
0.060 mg/l	EC_{50}	48 hours	31‰sal. 24°C
Penaeus aztecus (brown shrimp)			6044
0.001 mg/l	EC_{50}	48 hours	28‰sal. 24°C

PHOSDRIN^R

________ __________ ("natural phytoplankton communities")			6044
1.0 ppm	no change in productivity	4 hours	----
Crangon septemspinosa Say (sand shrimp)			6048
11 µg/l	LC_{50}	96 hours	24‰sal. 20°C
Crassostrea virginica (oysters)			6044
1.0 mg/l	no effect	96 hours	30‰sal. 22°C
Cyprinodon variegatus (juvenile sheepshead minnow)			6044
0.83 mg/l	EC_{50}	48 hours	31‰sal. 24°C
Pagurus longicarpus Say (hermit crab)			6048
28 µg/l	LC_{50}	96 hours	24‰sal. 20°C
Palaemonetes vulgaris Say (grass shrimp)			6048
69 µg/l	LC_{50}	96 hours	24‰sal. 20°C
Penaeus aztecus (brown shrimp)			6044
0.25 mg/l	EC_{50}	48 hours	32‰sal. 24°C

PARATHION continued

Cyprinodon variegatus (juvenile sheepshead minnow)			6044
0.060 mg/l	EC$_{50}$	48 hours	31‰sal. 24°C
Penaeus aztecus (brown shrimp)			6044
0.001 mg/l	EC$_{50}$	48 hours	20‰sal. 24°C

PHOSDRIN^{R}

_________ __________ ("natural phytoplankton communities")			6044
1.0 ppm	no change in productivity	4 hours	----
Crangon septemspinosa Say (sand shrimp)			6048
11 µg/l	LC$_{50}$	96 hours	24‰sal. 20°C
Crassostrea virginica (oysters)			6044
1.0 mg/l	no effect	96 hours	30‰sal. 22°C
Cyprinodon variegatus (juvenile sheepshead minnow)			6044
0.83 mg/l	EC$_{50}$	48 hours	31‰sal. 24°C
Pagurus longicarpus Say (hermit crab)			6048
28 µg/l	LC$_{50}$	96 hours	24‰sal. 20°C
Palaemonetes vulgaris Say (grass shrimp)			6048
69 µg/l	LC$_{50}$	96 hours	24‰sal. 20°C
Penaeus aztecus (brown shrimp)			6044
0.25 mg/l	EC$_{50}$	48 hours	32‰sal. 24°C

APPENDIX 6. OXYGEN, NUTRIENT, AND pH DATA

by Stephen W. Hager and Robert H. Bourke

Dissolved oxygen, inorganic micronutrient (phosphate, nitrate, silicate) and pH data were obtained on request from the National Oceanographic Data Center. Data were obtained for Marsden square 157, specifically for one degree squares between 124° and 125°W; 40° and 48°N. The information obtained was run on a computer to eliminate data from outside 10 nautical miles and then sorted by month.

Additional data were obtained from Oregon State University data reports (1231), and were also selected for observations inside of 10 nautical miles and sorted by month.

Information from Publication No. 25, California Water Quality Control Board (7014) was used in Figures A6-1 and A6-2.

The available data were then divided into the following geographical sections (shown in Figure 13-1).

Section 1: 40°34' to 41°03', Eel River to Trinidad Head, California (Figures A6-1 and A6-2)
Section 2: 43°00' to 44°33', Cape Blanco to Newport, Oregon (Figure A6-3)
Section 3: 44°34' to 46°05', Newport, Oregon to the mouth of the Columbia River (see Figure 13-2).
Section 4: 46°07' to 46°22', The area around the mouth of the Columbia River (Figure A6-4)
Section 5: 46°22' to 47°19', The Columbia River mouth to Cape Elizabeth, Washington (Figure A6-5)

Explanation of figures: Figures A6-1 and A6-2; numbers are plotted by season over a four-year period. Mean values from 0 to 20m (●), 21 to 75m (o), and greater than 75m (Δ) are shown, with the range of values indicated.

Figures A6-3, A6-4, and A6-5; numbers are plotted by month. Mean values for the surface (●), 20m (o) and 50m (Δ) are shown with the range of values indicated. If no range is given, the point is a single value. The maximum number of points making up a mean was 41.

Oxygen values are given in ml/l (N. T. P.), and nutrients in µg-at. /l.

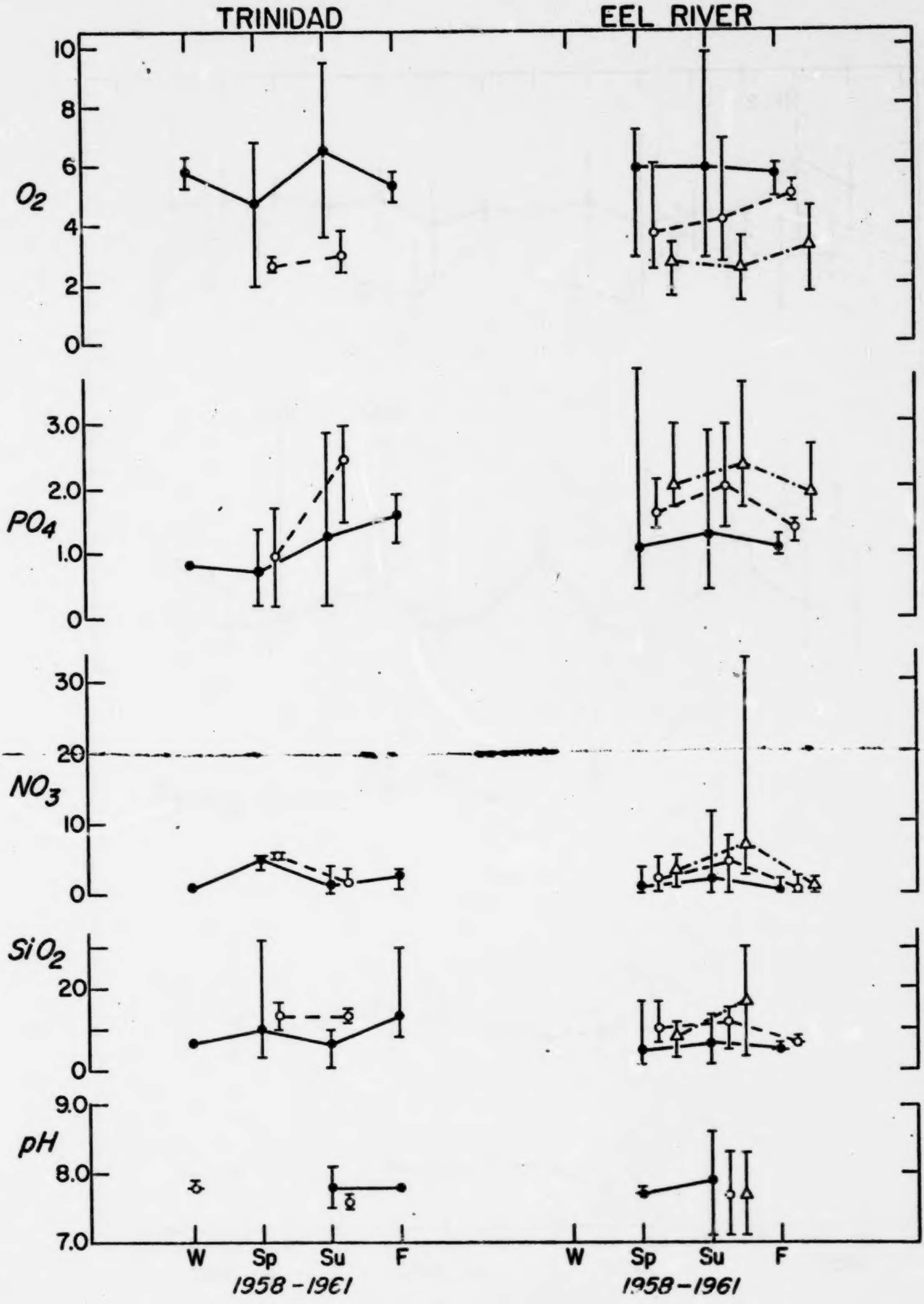

Figure A6-1. Oxygen, nutrient, and pH data; Trinidad Head and Eel River.

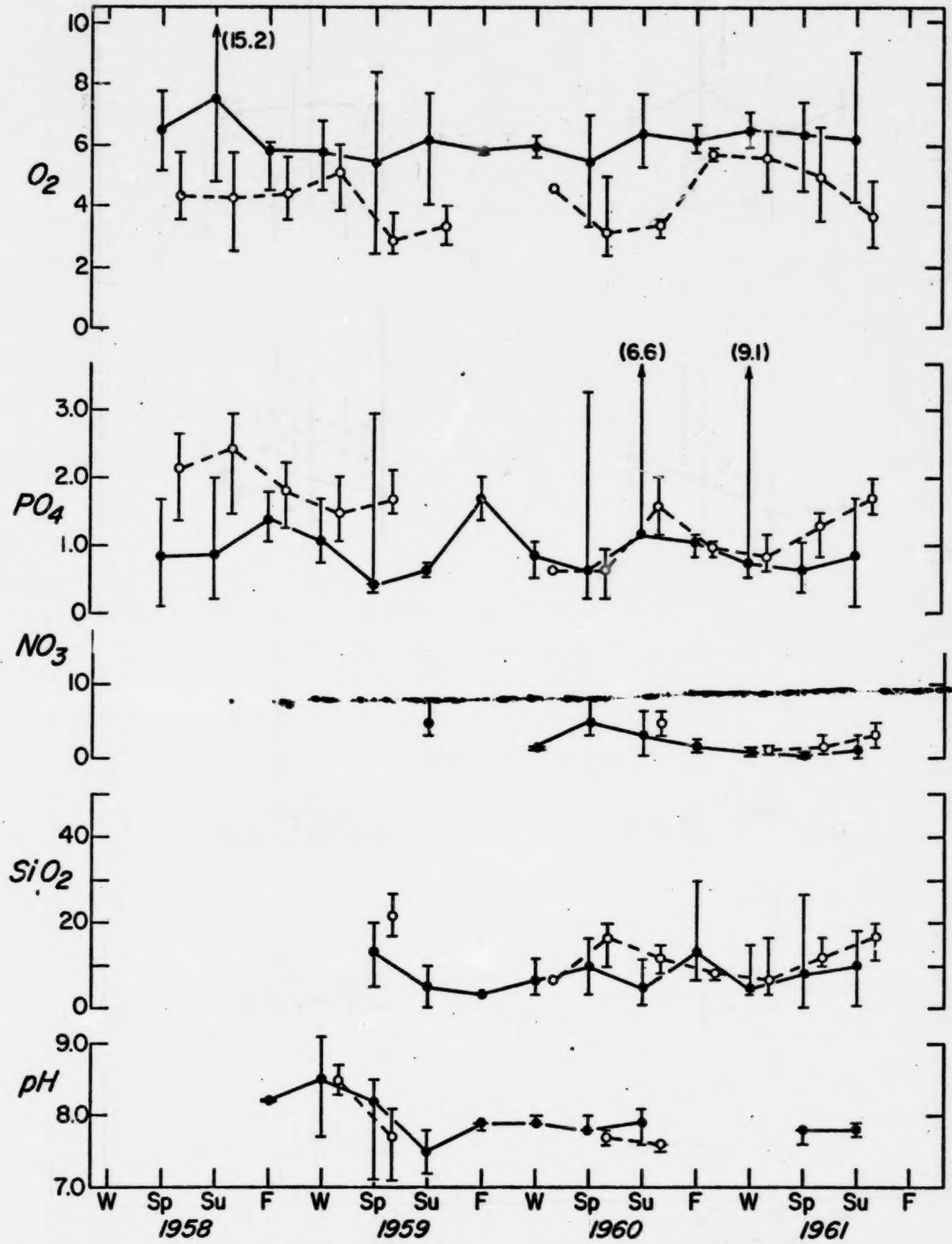

Figure A6-2. Oxygen, nutrient, and pH data; Samoa.

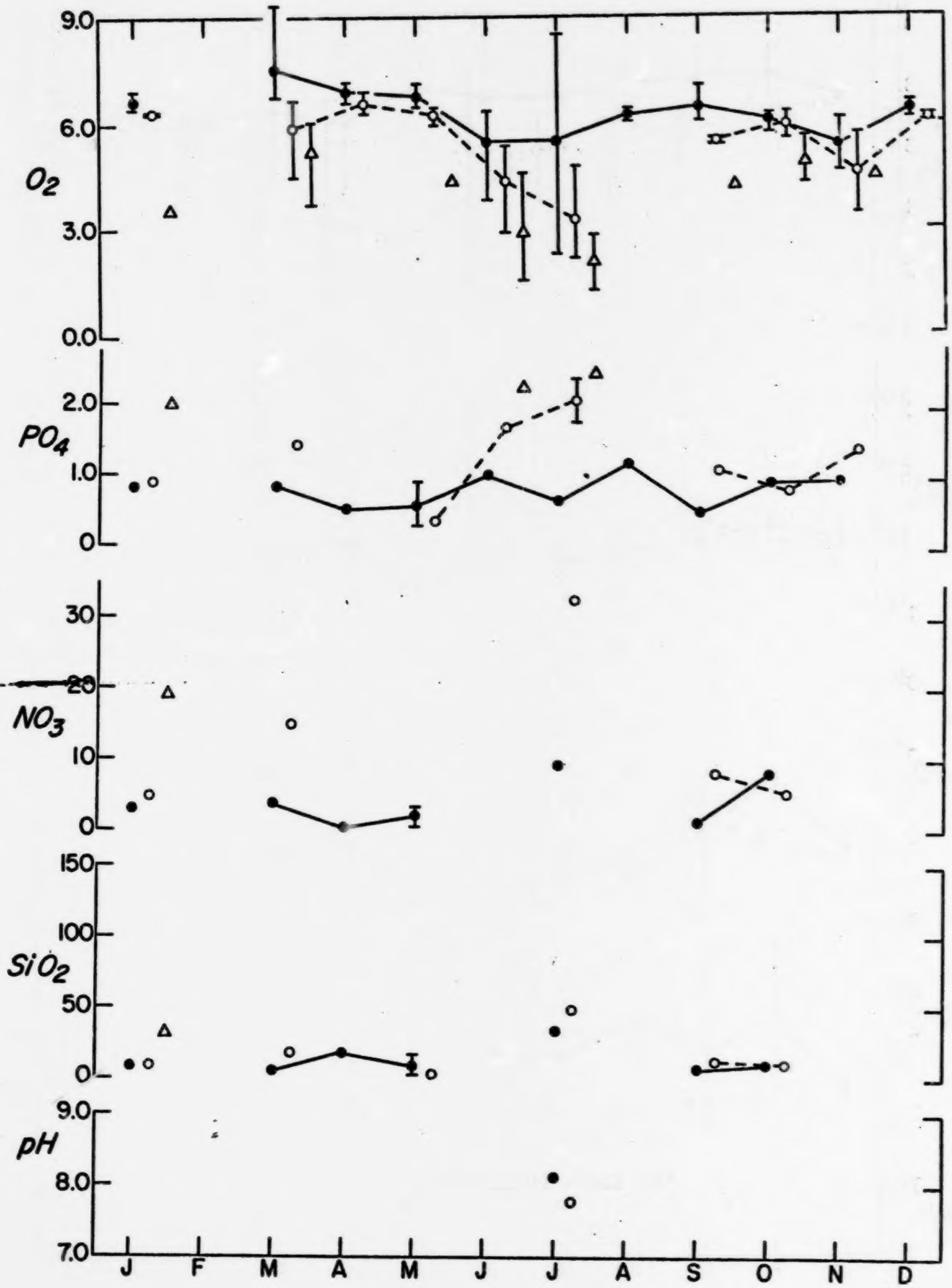

Figure A6-3. Oxygen, nutrient, and pH data; Cape Blanco to Newport.

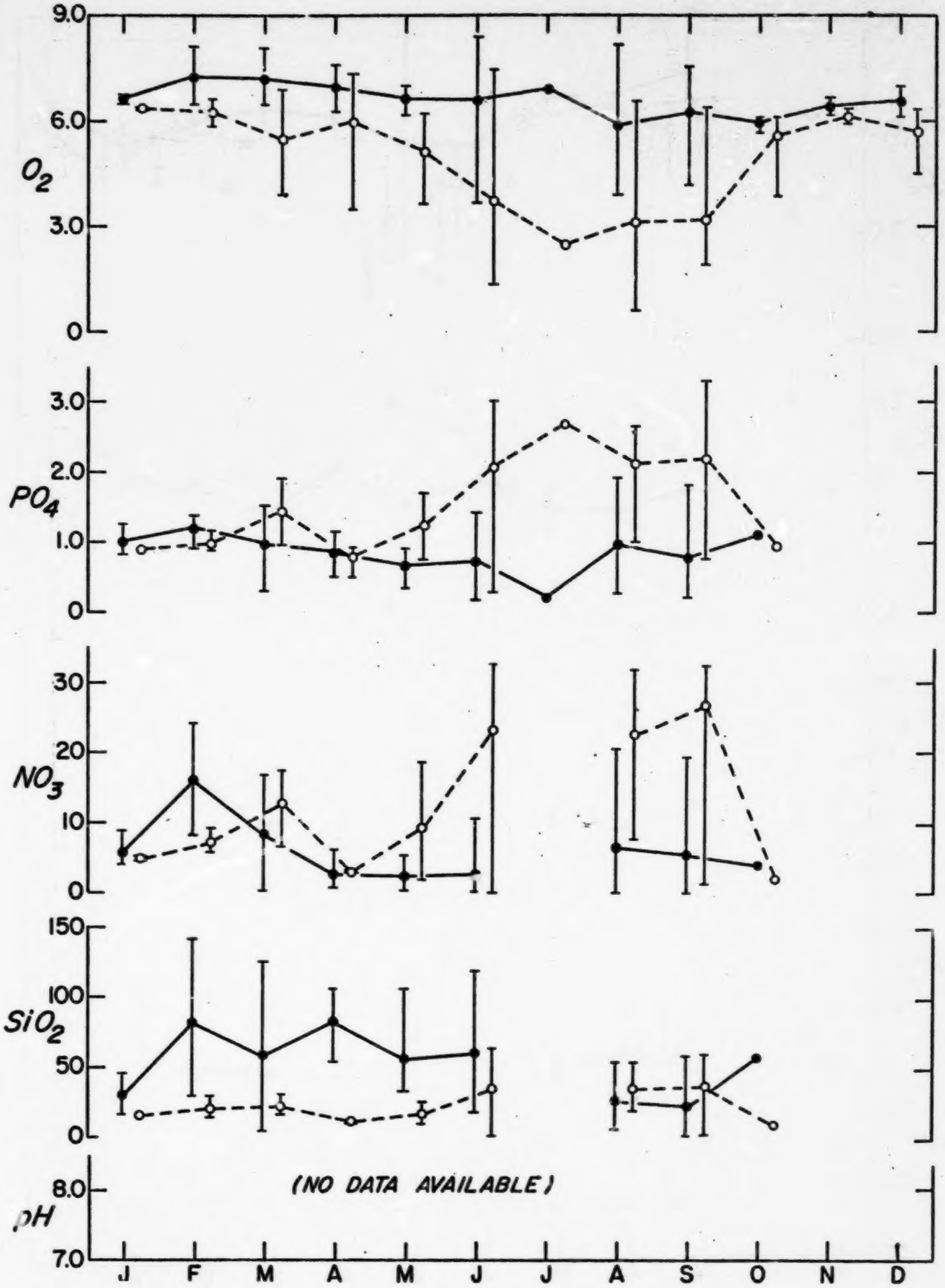

Figure A6-4. Oxygen, nutrient, and pH data; mouth of Columbia River.

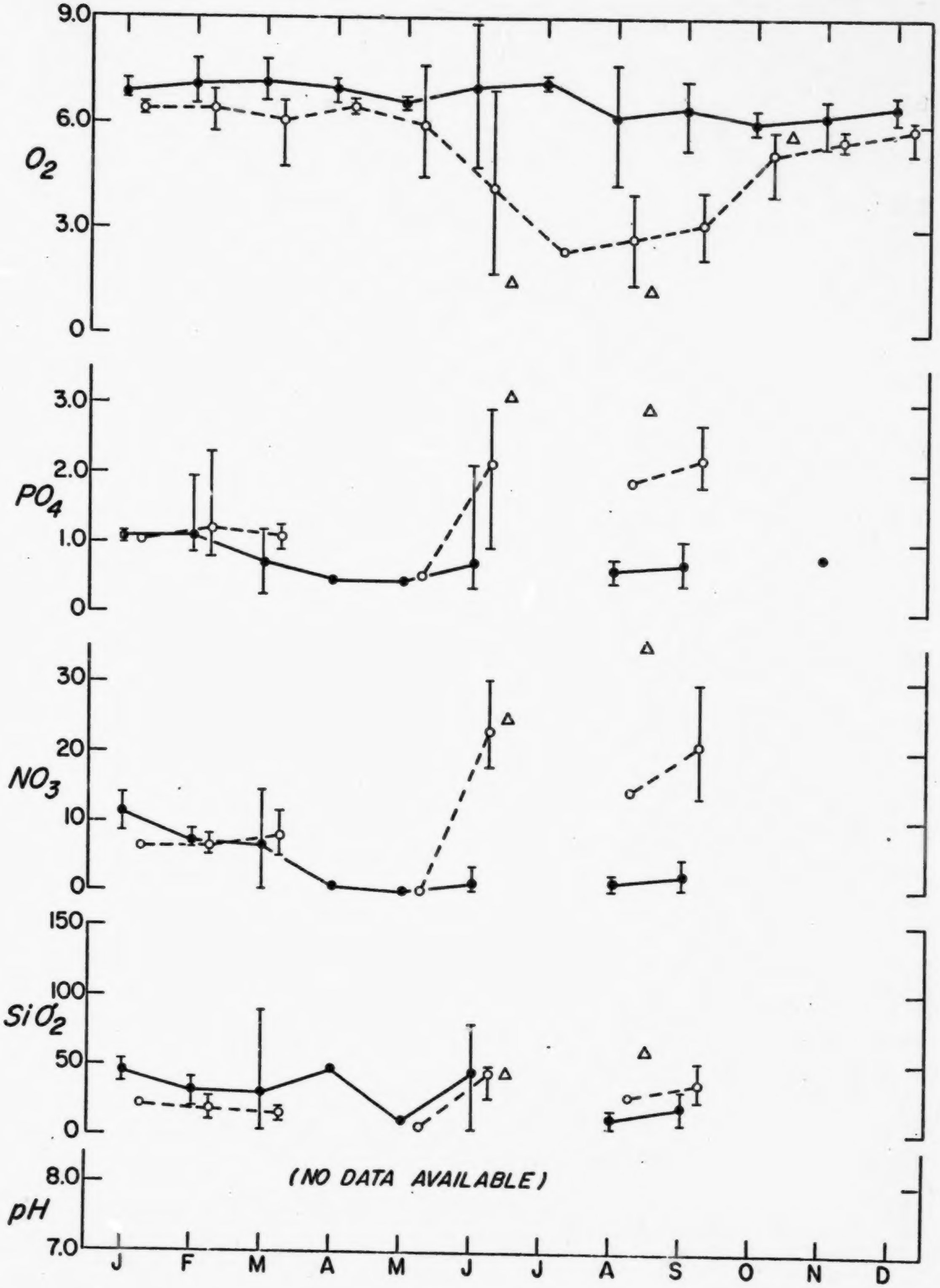

Figure A6-5. Oxygen, nutrient, and pH data; Columbia River to Cape Elizabeth.

APPENDIX 7. RADIONUCLIDES

by Gerald P. Romberg and William C. Renfro

Radioactive elements in the water, sediments, plants, and animals of the Pacific Northwest coast originate from a variety of sources. It is important to determine the levels of all radionuclides in the coastal environment. Further, baseline values for the more abundant radionuclides should be established over a sufficiently long period to fully account of various seasonal changes in their concentrations. Such baseline measurements will be vital to proper evaluation of the effects of nuclear power stations located on the coast.

The following sections, arranged alphabetically by element, present much of the available data on radionuclide levels in marine areas of the Pacific Northwest. An explanation of abbreviations used in this section is given below:

γ	gamma ray	Ci	curie
β^-	negative beta particle	μCi	microcurie (10^{-6}Ci)
β^+	positive beta particle	nCi	nanocurie (10^{-9}Ci)
α	alpha particle	pCi	picocurie (10^{-12}Ci)
n	neutron	g	gram
p	positron	mg	milligram (10^{-3}g)
(EC)	electron capture	kg	kilogram (10^3g)
dpm	disintigrations per minute	l	liter
MPC	maximum permissible concentration		

	Page
Antimony	121
Beryllium	121
Carbon	122
Cerium	123
Cesium	124
Chromium	126
Cobalt	129
Hydrogen	131
Iodine	132
Iron	133
Lead	135
Manganese	136
Niobium	162
Phosphorus	138
Plutonium	141
Polonium	142
Potassium	144
Radium	145
Ruthenium	146
Rubidium	148
Silver	148
Sodium	149
Strontium	150
Thorium	152
Uranium	153
Yttrium	154
Zinc	155
Zirconium and Niobium	162

ANTIMONY

Radioisotope	Half-life	Emission	Decay Product
^{124}Sb	60.4 days	β^-	^{124}Te (4043)
^{125}Sb	2.71 years	β^-	^{125}Te

Source: ^{124}Sb is neutron induced by the reaction ^{123}Sb (n,γ) ^{124}Sb and small amounts from Hanford reach the ocean (4043, 4202). ^{125}Sb is a daughter of ^{125}Sn formed by ^{124}Sn(n,γ)^{125}Sn.

Prescribed MPC in drinking water: ^{124}Sb - 2×10^{-2} µCi/kg
^{125}Sb - 1×10^{-1} µCi/kg (4008)

Recommended MPC in sea water: ^{125}Sb - 3.5×10^{-5} µCi/kg (4044)

Coastal water concentrations: ^{124}Sb tends to remain in solution much like ^{51}Cr (4126, 4205)

Biological importance: Reported concentration factor of ^{125}Sb in sea food is 1×10^{2} (4044)

Work on uptake, retention, distribution, turnover rates, and food chains: Laboratory study of ^{125}Sb uptake by foraminiferans (4156).

BERYLLIUM

Radioisotope	Half-life	Emissions	Decay Product
^{7}Be	53.6 days	(EC) γ	^{7}Li (4043)
^{10}Be	2.5×10^{6} years	β^-	^{10}B

Source: Cosmic ray produced from nitrogen and oxygen (4045).

Prescribed MPC in drinking water: ^{7}B - 2×10^{0} µCi/kg (4008)

Coastal water concentrations:

Oceanic water concentrations: At 350 miles off Newport, Oregon, in June 1967 the ^{7}Be concentration was 422 dpm/1000 l (~0.192 pCi/l) at 20 m depth and decreased to 50 dpm/1000 l (~0.024 pCi/l) at 328 m. The majority of the activity was in the solution fraction and surface values were similar in an adjacent area of high productivity (4188).

The concentration of ^{10}Be in sea water is reported to be 0.2 pCi/l (4126). The average specific activity of ^{10}Be in the ocean is given as 1.6×10^{-3} dpm ^{10}Be/g Be (4187).

Biological importance: These radionuclides form a part of the natural radiation environment in which the present world biota has evolved.

CARBON

Radioisotope	Half-life	Emissions	Decay Product
^{14}C	5,730 years	β^-	^{14}N (4043)

Source: Carbon-14 is neutron induced in reactors and nuclear blasts by the reaction ^{14}N (np)^{14}C (4043, 4045). The major source of ^{14}C is from the upper atmosphere where it is continually neutron induced by neutrons resulting from cosmic ray interactions (4207).

Prescribed MPC in drinking water: 8×10^{-1} μCi/kg (4008).

Recommended MPC in sea water: 7.0×10^{-6} μCi/kg (4044).

Coastal water concentrations:

Oceanic water concentrations: The concentration of ^{14}C in sea water is reported to be 0.15 pCi/l (4126), while the concentration in the world ocean has been calculated to be 2×10^{-13}Ci/l or 0.2 pCi/l (4097). The average specific activity of ^{14}C in the ocean is reported to be 10 dpm ^{14}C/g C (4187).

The ^{14}C concentration in the biosphere was believed to be in secular equilibrium at 7.5 ± 2.7 pCi ^{14}C/gC for at least 1,000 years prior to 1954 when ^{14}C introduced from nuclear weapons became sufficient to upset the equilibrium (4207).

The residence time of ^{14}C in the deep Pacific may exceed 800 years (4126).

Biological importance: The reported concentration factor of ^{14}C in sea food is 5×10^{3} (4044). Although the level of ^{14}C in the environment was increased by nuclear testing, the specific activity of ^{14}C has also been slightly decreased due to the production of CO_2 from the burning of fossil fuels.

Reported values in marine biological samples:

Work on uptake, retention, distribution, turnover rates, and food chains: Laboratory uptake study of ^{14}C by bacteria, shrimp, oysters and small fish (4177).

Laboratory uptake study of ^{14}C by Euphausia pacifica through ingestion (4178).

Laboratory study of isotope effect in plants (4179). Plants tend to reject heavier isotopes in favor of ^{12}C.

Studies of isotopic effect in plants, molluscs, and vertebrates (4180).

CERIUM

Radioisotope	Half-life	Emissions	Decay Product
^{141}Ce	32.5 days	β^- γ	^{141}Pr (4043)
^{144}Ce	284 days	β^- γ	^{144}Pr

Source: Both ^{141}Ce and ^{144}Ce are fission products present in the northern Pacific as a result fallout (4035,4207)

Prescribed MPC in drinking water: ^{141}Ce - 9×10^{-2} μCi/kg (4008)
^{144}Ce - 1×10^{-2} μCi/kg

Recommended MPC for sea water: ^{141}Ce - 9.0×10^{-4} μCi/kg (4044)
144Ce - 1.0×10^{-4} μCi/kg

Coastal water concentrations: The average $^{141-144}$Ce concentration at the mouth of the Columbia River from November 1961-June 1962 was 9.4 pCi/l with a maximum of 27 pCi/l. (4050)

Oceanic water concentrations:

Biological Importance: The reported concentration factor for both ^{141}Ce and ^{144}Ce is 1×10^3 (4044). Generally ^{141}Ce is confined to organisms of the first and second trophic levels, only rarely being found predominent in predacious animals in the sea (4072).

Reported values in marine biological samples: ^{141}Ce was measured in copepods, euphausiids, fish, salps, sergestids and viper fish collected 15-125 miles off Astoria, Newport, and Coos Bay during 1960-1962 (4069).

^{141}Ce in euphausiids collected 15 miles off Astoria in April 1962 0.8 pCi/g wet wt. (4072)

Work on uptake, retention, distribution, turnover and food chains: Laboratory uptake and retention of ^{144}Ce by planktonic algae indicates that particulate ^{144}Ce becomes associated with cells faster than ionic ^{144}Ce and that the more ^{144}Ce is present in the media the more is accumulated by the algae (4184).

In environmental samples of algae ^{144}Ce was absorbed or metabolically fixed (4186).

Zooplankton discriminate against ^{144}Ce which they take in from their food (4152).

Retention of ^{144}Ce in copepods (4155).

Laboratory uptake and retention of ^{144}Ce in hard clams, oysters, and bay scallops were carried out by Price (4176).

Laboratory uptake by marine fish was studied by Baptist (4185).

In environmental samples ^{141}Ce was found to be concentrated by primary producers and herbivores, but not carnivores (4072).

CESIUM

Radioisotope	Half-life	Emissions	Decay Product
^{137}Cs	30 years	β^-	^{137m}Ba (4043)

Source: Fission product present in fallout (4050).

Prescribed MPC in drinking water: 2×10^{-2} μCi/kg (4008).

Recommended MPC in sea water: 1.5×10^{-1} μCi/kg (4044).

Coastal water concentrations: The ^{137}Cs concentrations found by Park et al. (4077) along the Oregon coast in July 1964 are given below:

Mouth of Col. R. (Warrenton)	0. 19 pCi/l
8-10 miles off Col. R. mouth	0. 32 pCi/l
At Nehalem, Ore.	1. 2 pCi/l
At Newport, Ore.	0. 26 pCi/l

Ocean water contained more ^{137}Cs than Columbia River water.

At Scripp's pier in La Jolla, California, the 1960 ^{137}Cs concentration ranged from 0. 045 - 0. 163 pCi/l with a 0. 097 pCi /l average (4052,4015).

Oceanic water concentrations: Oceanic surface concentrations of ^{137}Cs are higher in the eastern part of the Pacific Ocean. These values have been observed to increase since the nuclear testing in 1961 and 1962. In the California Current typically high values in 1962 were 0. 4 pCi/l while in 1964 they had risen to about 0. 6 pCi/l and in 1965 values as high as 1. 2 pCi/l were observed (4015).

At 350 miles off Newport, Oregon, in June 1967 the ^{137}Cs concentration was 1330 dpm/1000 l (0. 605 pCi/l) at 20 m depth and decreased with depth to 4 dpm/1000 l at 656 m. The majority of the activity was in the soluble fraction and the surface activity was nearly doubled in an area of high productivity (4188).

Biological importance: Reported concentration factor of ^{137}Cs in sea food is 5×10^2 (4044).

Cesium-137 is not considered a biologically important element that is absorbed specifically. However, it behaves chemically like potassium and becomes widely distributed throughout the body largely in the muscle tissue (4174,4003,4126).

Reported values in marine biological samples: In albacore muscle from the Northeast Pacific in 1965-1966, ^{137}Cs activities averaged .090 pCi/g fresh weight (range .061-.135 pCi/g) in 18 specimens (4215).

Work on uptake, retention, distribution, turnover rates, and food chains: Laboratory uptake and exchange of ^{137}Cs by phytoplankton (4113).

Laboratory uptake of ^{137}Cs in an aquatic environment (4079). Plants grown in aquatic environment accumulate ^{137}Cs at least 500 times as much as reported for plants grown in soils.

In environmental samples of sea weed ^{137}Cs was absorbed or metabolicly fixed (4186).

Uptake and retention of ^{137}Cs by sea weeds (4060). Mostly on mechanisms of uptake.

Laboratory uptake of ^{137}Cs by phytoplankton, copepods, fish, and shellfish (4155).

Laboratory uptake of ^{137}Cs by protozoa, coelenterata, annelids, molluscs, crustaceans, and echinoderms (4174).

Laboratory uptake of ^{137}Cs by foraminiferans (4156).

Laboratory uptake of ^{137}Cs by shrimp, oysters, and small fish (4177).

Laboratory uptake of ^{137}Cs by lobsters and prawns (4175).

Laboratory uptake and retention of ^{137}Cs by hard clams, oysters, and bay scallops (4176).

Laboratory uptake of ^{137}Cs by marine fish (4115,4185).

In environmental samples collected from the Pacific off Oregon during 1961-1962, ^{137}Cs was found only in the herbivores and carnivores (4072).

Concentration factors of ^{137}Cs for various marine organisms (4100).

CHROMIUM

Radioisotope	Half-life	Emission	Decay Product
^{51}Cr	27.8 days	γ	^{51}V (4043)

Source: The main source of ^{51}Cr in the Northeast Pacific is Hanford, where it is neutron induced in the reaction ^{50}Cr (n γ) ^{51}Cr (4050,4093)

Prescribed MPC in drinking water: 2×10^0 μCi/kg (4008)

Recommended MPC for sea water: 1.4×10^0 μCi/kg (4044)

Coastal water concentrations: In sea water ^{51}Cr from Hanford remains in the hexavalent state and exhibits a conservative nature with the majority of the activity remaining in solution (4229). The largest coastal values are found along the Washington coast in the winter when the Columbia River plume extends northward near the coast and dilution by sea water is restricted. In the summer the plume extends to the south and offshore resulting in greater dilution and lower coastal concentrations than the northern winter values. Summer upwelling along the coast also tends to reduce ^{51}Cr concentrations (4057). Representative winter and summer 1966 contours as found by Frederick (4102) are shown in Figure A7-1.

The amount of ^{51}Cr discharged into the Pacific depends on the number of reactors in operation at Hanford. Discontinuation of several reactors in the mid-1960's decreased the levels of ^{51}Cr greatly (4204).

In sediment samples collected near the Columbia River mouth, ^{51}Cr was found to be a major gamma emitter with 1963 values ranging from 10-100 pCi/g dry wt. (4034,4037).

Oceanic water concentrations: Chromium-51 of Hanford origin has been detected in surface water up to 380 km south of the Columbia River mouth and 240 km offshore (4102). The contours in Fig. A7-1 are an indication of the ^{51}Cr values present.

Biological importance: Reported concentration factors in the sea food: 1×10^5 (4044). In samples collected 15 miles off Astoria, ^{51}Cr was abundant only in primary producers with apparently little transferred up the food chain to the second, third or fourth trophic levels (4072).

Reported values in marine biological samples: ^{51}Cr on millipore filters (primary producers plus suspended material) collected 15 miles off Astoria in April 1962 contained about 16 pCi/l (4072).

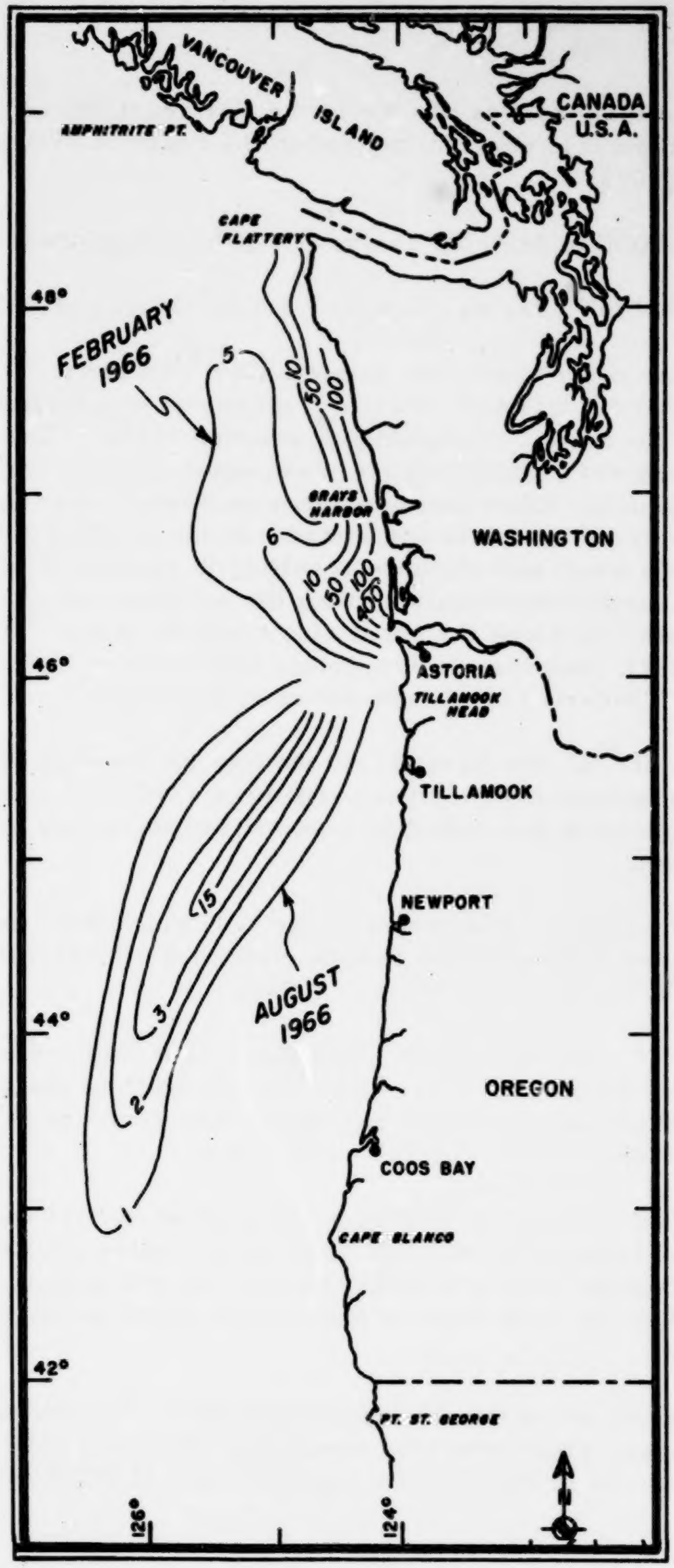
VANCOUVER
ISLAND
AMPHITRITE PT.
CANADA
U.S.A.
CAPE FLATTERY
48°
FEBRUARY 1966
5
10
50
100
GRAYS HARBOR
WASHINGTON
6
10
50
100
400
46°
ASTORIA
TILLAMOOK HEAD
TILLAMOOK
NEWPORT
15
AUGUST 1966
3
44°
2
OREGON
COOS BAY
1
CAPE BLANCO
42°
PT. ST. GEORGE
126°
124°
N

Figure A7-1. Surface ^{51}Cr activities in the Northeast Pacific Ocean during 1966 (from Frederick, 4102). Activities are in pCi/l.

^{51}Cr values measured in euphausiids from 40-105 miles off Astoria ranged from 4 to 28 pCi/g dry weight (4074).

Work on uptake, retention, distribution, turnover, and food chains: The chemical form of ^{51}Cr affects its uptake by organisms. Hexavalent ^{51}Cr tends to remain in solution and is less likely to be concentrated by organisms (4126, 4158). Trivalent ^{51}Cr is mostly particulate in sea water being actively absorbed on both living and dead particles (4154,4030).

Uptake and transfer of ^{51}Cr III through a laboratory food chain of phytoplankton, brine shrimp, post-larval fish, and mummichog showed that uptake by food chain was generally an efficient pathway for all trophic levels except the second (4153).

Laboratory uptake of ^{51}Cr III by phytoplankton was studied by Curl (4030).

Laboratory uptake and retention studies of ^{51}Cr III and ^{51}Cr IV by a marine polychaete worm show that hexavalent ^{51}Cr was taken up by the worm, but trivalent ^{51}Cr was only associated with sediment adhering to the worms (4154).

Laboratory uptake and metabolism by crabs was studied by Sather (4103).

Environmental study of ^{51}Cr distributions in dungeness crab body parts were carried out by Tenant (4104).

COBALT

Radioisotope	Half-life	Emissions	Decay Product
^{57}Co	270 days	(EC) $\beta^{+}\gamma$	^{57}Fe (4043)
^{58}Co	71.3 days	(EC) $\beta^{+}\gamma$	^{58}Fe
^{60}Co	5.26 years	$\beta^{-}\gamma$	^{60}Ni

Source: ^{57}Co - neutron induced in reaction ^{58}Ni(n,np) ^{57}Co in nuclear blasts (4043). ^{58}Co - neutron induced in reaction ^{58}Ni(n,np) ^{58}Co in reactors and nuclear blasts. ^{60}Co - neutron induced in reaction ^{59}Co (n γ) ^{60}Co in nuclear tests and reactors.

Major source in the northeast Pacific is from fallout.

Prescribed MPC in drinking water: ^{57}Co - 5 x 10^{-1} μCi/kg (4008)
^{58}Co - 1 x 10^{-1} μCi/kg
^{60}Co - 5 x 10^{-2} μCi/kg

Recommended MPC in sea water: ^{57}Co - 5. 0 x 10^{-5} μCi/kg (4044)
^{58}Co - 1. 0 x 10^{-5} μCi/kg
^{60}Co - 5. 0 x 10^{-6} μCi/kg

Coastal water concentrations: In 1961-1962 ^{60}Co values along the coast between Baja California and San Francisco were often 10 times less than that measured in the open sea--no values given. This was a time of increased fallout and low coastal values are attributed to upwelling and a coastal counter current (4015).

Values in sediments off the Columbia River show small amounts of ^{60}Co present (4037).

Oceanic water concentrations: Several ^{60}Co values were measured 350 miles off Newport. Most of the ^{60}Co was in ionic form. To the ^{60}Co activity was traced to 656 m with the concentration almost uniform with depth at about 0. 5 dpm/1000 l. Surface values were higher in an area of high productivity (4188).

Biological importance: Reported concentration factor in sea food is 1 x 10^4 (4044). Omnivorous fish and carnivorous tunas were found to discriminate against ^{60}Co (4149).

^{60}Co was found in a number of estuarime samples at Bradwell, Essex - first evidence of such contamination from an electric power station site (4041,4042).

^{60}Co was one of the principle radionuclides in marine organisms near the test site five years after the Bravo event (4148).

Reported values in marine biological samples: Higher concentrations of ^{60}Co was noted in livers of oceanic squids taken west of the California Current than in similar tissues of coastal squid. No ^{60}Co was detected in livers of squid from the Monterey coasts (4053).

Work on uptake, retention, distribution, turnover and food chains: Uptake of ^{57}Co by phytoplankton (4154). Role of phytoplankton in the cycling of ^{60}Co (4113). Accumulation of ^{60}Co by foraminiferans (4156). Uptake of ^{60}Co in mussels was shown to be inhibited by EDTA (4147). Elimination rates of ^{60}Co were given for: copepods, pyrosoma, salpidae, sagitta, euphausiids, and pteropods (4157). ^{57}Co and ^{60}Co were 3 to 4 times higher in zooplankton than in phytoplankton collected near Puerto Rico (4152).

^{60}Co was found only in herbivores and carnivores collected 25 miles or more off Oregon (4072).

Concentration factors of ^{60}Co in many marine organisms calculated (4062,4100).

HYDROGEN

Radioisotope	Half-life	Emissions	Decay Product
^{3}H	12.262 years	β^{-}	^{3}He (4043)

Source: Tritium is produced both in nuclear reactors and nuclear blasts. The major of ^{3}H, however, is from the atmosphere where it is produced by cosmic rays (4045,4002).

Prescribed MPC in drinking water: 3×10^{0} μCi/kg (4008)

Recommended MPC in sea water: 1.6×10^{-1} μCi/kg (4044)

Coastal water concentrations:

Oceanic water concentrations: The total annual production of ^{3}H in the atmosphere is $4\text{-}8 \times 10^{6}$ Ci. The concentration in sea water is reported to be 3 pCi/l (4126). Pertsov (4097) calculates the average concentration of ^{3}H in the world ocean to be 1 pCi/l.

The maximum residence time in the mixed layer of the north Pacific is thought to be 3.5 years (4187).

The average specific activity of tritium in the ocean is 3.3×10^{-4} dpm ^{3}H/g H (0.00015 pCi ^{3}H/g H) (4187).

Biological Importance: ^{3}H is not presently considered to be concentrated to significant degree by organisms. Furthermore, the vast abundance of stable ^{1}H atoms present in the biosphere probably insures great isotope dilution.

IODINE

Radioisotope	Half-life	Emissions	Decay Products
^{131}I	8.05 days	$\beta^{-}\gamma$	^{131}Xe (4043)

Source: Fission product present in fallout (4043,4208)

Prescribed MPC in drinking water: 3×10^{-4} μCi/kg (4008)

Recommended MPC in sea water: 1.6×10^{-3} μCi/kg (4044)

Coastal water concentrations: Due to the short half-life ^{131}I is significant primarily in local and tropospheric fallout (4208). For this reason it is unlikely that much ^{131}I would accumulate in surface water far from a test site.

Oceanic water concentrations:

Biological importance: Reported concentration factor in sea food is 1×10^{4} (4044). Iodine-131 is important because it is concentrated in the thyroid gland and can cause a highly localized radiation dose in this organ (4044).

Values reported in marine biological samples: ^{131}I activities up to 24 pCi/g fresh weight were reported in tuna muscle following atmospheric bomb tests near Christmas Island in 1962 (4214).

Work on uptake, retention, distribution, turnover, and food chains: Uptake of ^{131}I by a red algae (4117). Elimination rate of ^{131}I calculated for copepods, pyrosoma, sagitta, euphausiids, and pteropods (4157).

Distribution of ^{131}I in mussels (4068).

Concentration factors of ^{131}I calculated for many marine organisms (4062,4100).

IRON

Radioisotope	Half-life	Emissions	Decay Product
^{55}Fe	2.6 years	(EC) γ	^{55}Mn (4043)
^{59}Fe	45.6 days	β^{-} γ	^{59}Co

Source: ^{55}Fe - neutron induced by the reaction ^{54}Fe (n γ)^{55}Fe in nuclear tests and reactors. Major source in northeast Pacific is from fallout (4050,4120). ^{59}Fe - neutron induced in reaction ^{59}Fe(n γ)^{59}Fe in nuclear tests and reactors. Major source in northeast Pacific is from fallout.

Prescribed MPC in drinking water: ^{55}Fe - 8×10^{-1} μCi/kg (4008)
^{59}Fe - 6×10^{-2} μCi/kg

Recommended MPC in sea water: ^{55}Fe - 3.8×10^{-5} μCi/kg (4044)
^{59}Fe - 3.0×10^{-6} μCi/kg

Coastal water concentrations: Concentration of ^{55}Fe in California coastal water collected in late 1965 was 4×10^{-5} nCi/kg (0.04 pCi/kg) (4167).

There appears to be no rapid transport of ^{55}Fe to the bottom (4120).

Oceanic water concentrations: Concentration of ^{55}Fe in oceanic water 350 miles off Newport in June 1967 was about 3 dpm/1000 l (1.3 pCi/1000 l) down to 1524 m. The majority of the ^{55}Fe was in a soluble form. Surface concentrations were about 90 times greater in an area of high productivity (4188).

Biological importance: One reported concentration factor for ^{55}Fe and ^{59}Fe in sea food is 2×10^{4} (4044).

The highest levels of ^{55}Fe found in man are associated with a high consumption of ocean fish (4024).

Iron-55 was identified in a number of estuary materials near Bradwell, Essex in 1966, which was the first evidence of such contamination from a power station site (4041).

Reported values in marine biological samples: Concentration of ^{55}Fe in Pacific coast organisms reported by Palmer et al. (4076,4167):

Organism	Location collected	^{55}Fe activity in nCi/kg wet
salmon	Alaska	93 nCi/kg
salmon	Washington coast	14
albacore	N. Pacific	42.0
sea bass	Washington coast	0.27
smelt	Washington coast	1.41
saury	Oregon coast	106.0
phytoplankton	Calif. coast	0.5
Euphausiids	Oregon coast	1.5
Mytilus	Calif. coast	0.36
kelp	Calif. coast	0.03
barnacles	Calif. coast	140.0
purple sea cucumbers	Oregon coast	76.0
sea urchins	Oregon coast	0.48

Oysters, scallops, clams, shrimp and crab had very little ^{55}Fe.

^{55}Fe specific activities in salmon reported by Jennings (4120): S.A. in μCi ^{55}Fe/g Fe.

Species	Chinook		Sockeye		Coho	
Year	1964	1967	1964	1967	1964	1967
Location						
Bristol Bay	11.1	0.71	11.4	0.51		
St. of Juan de Fuca	0.745		28.7		1.57	
Astoria	0.723	0.175		1.17		0.290
Depoe Bay					5.72	
Eureka	6.44				5.83	

The ^{55}Fe specific activity in *Euphausia pacifica* collected in August 1967 between Longbeach, Washington, and Depoe Bay, Oregon, ranged between 0.007 and 0.101 μCi ^{55}Fe/g Fe (4120).

Work on uptake, retention, distribution, turnover, and food chains: Uptake of ^{59}Fe by a marine diatom (4165).

Elimination rate of ^{59}Fe by a salt marsh snail (4121).

Elimination rate of ^{55}Fe by pyrosoma and pteropods (4157).

Omnivorous fish feeding on plankton concentrate ^{55}Fe while carnivorous fish feeding on omnivorous fish discriminate against ^{55}Fe (4149).

LEAD

Radioisotope	Half-life	Emissions	Decay Product
^{210}Pb	20.4 years	$\beta^- \gamma$	^{210}Bi (4043)

Source: Daughter of ^{214}Po in ^{238}U decay chain; its precursor in the decay chain is ^{222}Rn (4193).

Prescribed MPC in drinking water: 1×10^{-4} μCi/kg (4008)

Recommended MPC for sea water:

Coastal water concentrations: At La Jolla pier in Nov. 1960 the ^{210}Pb concentration was found to be 0.12 dpm/l or ~0.06 pCi/l (4192).

Oceanic water concentrations: The concentration of ^{210}Pb found in Pacific surface water was 0.10 dpm/l or ~0.05 pCi/l and increased with depth to 0.28 dpm/l or ~0.14 pCi/l at 2000 m deep (4192,4015).

Biological importance: ^{210}Pb is important because it decays to ^{210}Bi which shortly decays to ^{210}Po, a radionuclide greatly contributing to the internal dose rate of organisms (4193,4159).

Reported values in biological samples: ^{210}Pb concentrations in many organisms collected 65 miles off Newport are given by Beasley (4193).

Other ^{210}Pb concentrations reported by Beasley are:
Yaquina Bay copepods (*Acartia clausii*) = 0.060 - 0.55 dpm/g wet
Oceanic copepods from NH-15 (*Calanus pacificus*) = 0.045 dpm/g wet
Polychaete worms from NH-24 = 10.40 dpm/g wet

^{210}Pb values reported by Folsom (4015) are:
Brown algae = 14.4 ± 1.6 pCi/kg wet wt.
Red tide = less than 0.1 pCi/kg wet wt.
Bonito = 20.4 ± 2 pCi/kg wet wt.
Squid tissue = 28.9 ± .92 pCi/kg wet wt.

^{210}Pb concentrations given by Holtzman (4159):
Euphasia pacifica 6/1/65 = 3.75 ± .33 pCi/100 g wet
Squid = 0.92 ± .20 pCi/100 g wet
Sea urchin 4/7/66 shell = 6.0 ± 0.5 pCi/100 g ash
(from near Los Angeles)
spine = 5.0 ± 0.6 pCi/100 g ash
soft tissue = 1.07 ± 0.27 pCi/100 g wet

^{210}Pb concentration in lantern fish decreased with depth (4193).

Work on uptake, retention, distribution, turnover and food chains: ^{210}Pb in trophic levels II and III were correlated with inshore and offshore stations. Higher values were found offshore during periods of little rain and offshore water movement; higher values in waters inside 45 miles during periods of high rain (4193).

MANGANESE

Radioisotope	Half-life	Emissions	Decay Product
^{54}Mn	303 days	(EC) γ	^{54}Cr (4043)

Source: Neutron induced in reaction ^{54}Fe(n,p)^{54}Mn and present in fallout (4050).

Prescribed MPC in drinking water: 1×10^{-1} μCi/kg (4008).

Recommended MPC in sea water: 6.7×10^{-6} μCi/kg (4044).

Coastal water concentrations: The ^{54}Mn concentration in coastal water along lower California was estimated to be 0.037 pCi/l based on values present in organisms and reported concentration factors (4019). In June 1963 the ^{54}Mn concentration measured in sea water at Scripp's pier ranged between 0.02-0.08 pCi/l (4029). Seasonal variation was as much as six-fold with the minimum occurring in the mid-winter (4019).

Much of the particle bound ^{54}Mn entering the ocean is released to the sea water (4031).

Oceanic water concentrations:

Biological importance: Reported concentration factor of ^{54}Mn in sea food is 5×10^4 (4044). Five years after the Bravo event ^{54}Mn was one of the principle radionuclides in marine organisms (4090).

Reported values in marine biological samples: Values of ^{54}Mn in salmon viscera collected in the summer of 1964 and reported in pCi/g dry wt by Kujala (4114):

Species	St. of Juan de Fuca	Astoria	Depoe Bay	Eureka
Chinook	0.08	0.04	1.72	
Coho	1.40	0.85	1.73	
Sockeye	3.00			
Herring			0.22	
Anchovies			1.91	0.57

In coastal organisms of southern California the ^{54}Mn values ranged between 0.01-0.4 pCi/g fresh wt (4029).

Values of ^{54}Mn in the livers of albacore tuna collected off Oregon (4146).

Work on uptake, retention, distribution, turnover rates and food chains: In environmental samples of seaweed ^{54}Mn was absorbed or metabolically fixed (4186).

Laboratory uptake and retention of ^{54}Mn by the lobster was studied by Bryan (4125).

Laboratory uptake and retention of ^{54}Mn by mussels with different concentrations of EDTA (4147).

In nature mussels and barnacles concentrate ^{54}Mn more than ^{65}Zn; the opposite is true for fish (4029).

Environmental samples of sockeye salmon show that females concentrate ^{54}Mn to higher levels than do males (4114).

In samples collected from the Pacific off Oregon during 1961-1962, ^{54}Mn was found only in herbivores and carnivores (4072).

NIOBIUM-- see Zirconium-Niobium (p. 162)

PHOSPHORUS

Radioisotope	Half-life	Emissions	Decay Product
^{32}P	14.28 days	β^-	^{32}S (4043)

Source: Small amounts of ^{32}P are cosmic-ray produced (4045). The major source of ^{32}P reaching the Washington and Oregon coasts is Hanford, where ^{32}P is produced by neutron induction of coolant water impurities and corrosion film in the reactions $^{32}S(np)^{32}P$ and $^{31}P(n\gamma)^{32}P$ and then expelled into the Columbia River (4093, 4195).

Prescribed MPC in drinking water: 2×10^{-2} μCi/kg (4008)

Recommended MPC in sea water: 2.8×10^{-6} μCi/kg (4044)

Coastal water concentrations: Due to the short half-life of ^{32}P and the one to three week travel time for Columbia River water from Hanford to the ocean, a large amount of the ^{32}P introduced into the river would decay before reaching the ocean. The ^{32}P concentration is greatly reduced further by dilution and the many physical and biological processes in the river (4211). The amount of ^{32}P coming from Hanford depends on the number of reactors in operation.

The concentration of ^{32}P nine miles off the Columbia River mouth in July 1963 was 4.68 ± 1.63 pCi/l (4050).

In the Columbia River estuary at Astoria, the ^{32}P levels for 1965 were less than 45 pCi/l (Toombs 4196).

At North Head, Washington (~3 mi. north of the river mouth) the concentration of ^{32}P in water averaged 1.41 pCi ^{32}P/l between October 1965 and September 1966 (4211).

The amount of ^{32}P discharged into the Pacific by the Columbia River depends on the number of reactors in operation and to a lesser extent on the river flow rate.

Oceanic water concentrations: The following ^{32}P values are given for filtered surface sea water collected off the Columbia River in July 1963 by Chakravarti (4050) and Seymour (4093):

Miles from mouth	Salinity %	^{32}P (pCi/l ± S. D.)
18	27.80	8.03 ± 0.58
24	31.63	5.15
30	31.76	3.57 ± 0.60

Biological importance: Phosphorus is a biologically important element, therefore ^{32}P is readily taken up and will increase the internal dose rate due to the beta emissions.

For people living near the Columbia River below Hanford, ^{32}P from ingested Columbia River fish is the most significant source of radiation (4016). In marine organisms, however, the ^{32}P levels are much lower (4196, 4211). In no case do the ^{32}P levels in Columbia River or marine organism constitute a health hazard (4016).

Reported values in marine biological samples: Concentration of ^{32}P in Willapa Bay oysters (4007). Concentration of ^{32}P in Fucus from North Head (4093). Concentration in various marine organisms (4196).

The following mean ^{32}P values and concentration factors for samples collected from North Head, Washington, during the period from October 1965 to September 1966 are given by Isakson (4211):

Organism Tissue	^{32}P concentration (pCi ^{32}P/g dry) Range-estimated from graphs	^{32}P concentration (pCi ^{32}P/g dry) Mean-from Table 7 (pg 50)	Range of ^{32}P concentration factors x 10^3
Razor clam soft parts	20 - 560	158	2.3 - 70
Mussel, soft parts	50 - 400	147	3.5 - 41
Gooseneck barnacle, entire	2 - 45	16	0.21 - 7.0
Sea anemone, entire	3 - 70	27	0.51 - 9.8
Algae, entire: *Fucus fucatus*	0 - 130	44	0.21 - 11
Gigartina sp.	10 - 150	60	1.3 - 22
Rhodomela larix	10 - 180	65	0.92 - 15
Pterosiphonia woodii	10 - 180	70	1.0 - 15
Iridaea sp.	10 - 150	64	0.64 - 12
Ulva sp.	one sample	227	18

Work on uptake, retention, distribution, turnover and food chains: Turnover of ^{32}P in the marine environment (4118).

Role of phytoplankton in the cycling of ^{32}P (4113).

Uptake, distribution, and retention in copepod (*Calanus*); located in ovary of female and appears in eggs of laying females (4182).

Uptake in *Artemia* and *Gammarus*; turnover time in *Artemia* = 14 hours (Harris 4133).

Molluscs take up ^{32}P directly from the water (4181).

PLUTONIUM

Radioisotope	Half-life	Emissions	Decay Product
^{238}Pu	86.4 years	α γ	^{234}U (4043)
^{239}Pu	24,390 years	α γ	^{235}U

Source: ^{238}Pu - daughter of ^{238}Np from $^{237}Np(n\,\gamma)^{238}Np$ (4043)
^{239}Pu - daughter of ^{239}U produced in reaction $^{238}U(n\gamma)$ $^{239}U(\beta^-)$ and present in fallout (4043,4015)

Prescribed MPC in sea water: ^{239}Pu - 2.2×10^{-6} μCi/kg (4044)

Prescribed MPC in drinking water: ^{238}Pu - 5×10^{-3} μCi/kg
^{239}Pu - 5×10^{-3} μCi/kg (4008)

Coastal water concentrations: The ^{239}Pu concentration at Scripp's pier in 1964 ranged from $3.5 - 4.7 \times 10^{-4}$ pCi/l (4080).

The ^{238}Pu concentration in sea water is very small. From values of ^{238}Pu and ^{239}Pu found in kelp, the ratio of $^{238}Pu/^{239}Pu$ in sea water is thought to be about 1/30 (4015).

The average ^{239}Pu concentration of two water samples from near Pt. Arguello, California, in 1964 was 0.001 pCi/l (4015).

Oceanic water concentrations: The ^{239}Pu concentration in water 1,500 miles off the California coast in 1964 was 19.4×10^{-4} pCi/l and at 2,500 miles offshore it was 30.4×10^{-4} pCi/l (4080).

There is some indication that in the open ocean plutonium penetrates downward more rapidly than ^{90}Sr and ^{137}Cs in the same area (4015).

Biological importance: Reported concentration factor of ^{239}Pu in sea food is 1×10^{3} (4044).

Reported values in marine biological samples: Values of ^{239}Pu in coastal organisms collected from Lower California during 1964 (4080).

Organism	Concentration in pCi/kg wet
red tide	0.276 ± .037
green algae	0.653 ± .043
green kelp	0.321 ± .025
palm kelp	0.450 ± .023
plankton	1.08 ± .14
mussels	0.96 ± .007
mussels	0.120 ± .012
fish	0.0044

Mytilus sp. collected from an island off Point Arguello, California, during 1964 had a ^{239}Pu value of 0.57 pCi/kg wet (4015).

Work on uptake, retention, distribution, turnover rates and food chains: Distribution studies of plutonium in the lobster show that the shell contains a large portion of the total activity (4015).

Measuring present levels of plutonium in sea water is difficult, therefore, marine organisms will probably be found to contain only minute amounts (4015).

POLONIUM

Radioisotope	Half-life	Emission	Decay Product
^{210}Po	138.4 days	α γ	^{206}Pb (4043)

Source: Daughter of ^{210}Bi in ^{238}U decay chain.

Prescribed MPC in drinking water: 7×10^{-4} μCi/kg (4008)

Recommended MPC for sea water: 6×10^{-7} μCi/kg (4044)

Coastal water concentrations: At La Jolla pier in 1965 the ^{210}Po concentration was found to be 0.03 pCi/kg (4015).

Oceanic water concentrations: Average ^{210}Po concentration measured in the Atlantic between 20°N and 20°S was 0.042 pCi/liter or ~0.09 dpm/l (4193).

Biological importance: Reported concentration factor in sea food: 1×10^4 (4044). The radiation dose of fish residing near the surface has been shown to be increased six fold as a result of internal ^{210}Po (4193).

Reported values in marine biological samples: Due to the involved procedure necessary for sample analysis and only relatively recent awareness of the resulting radiation dose only a few researchers have studied ^{210}Po in ocean organisms.

^{210}Po values given by Holtzman (4159): Euphasia pacifica 6/1/65 = 26.7 ± 1.3 pCi/100 g wet; Squid = 13.2 ± 0.9 pCi/100 g wet; sea urchin from Los Angeles area - shell = 12.2 ± 0.7 pCi/100 g ash, spines = 18.3 ± 0.9 pCi/100 g ash, soft tissue = 15.1 ± 0.7 pCi/100g wet.

Kelp from California coast in 1961: 91 pCi/kg wet wt. (4015)
Brown algae from Calif. coast in 1965: 173.5 ± 12.0 pCi/kg wet (4015)
Copepods from Yaquina Bay, Ore. in 1968: 0.36 - 1.15 pCi/g wet wt. (4193)
Red tide from Calif. coast in 1965: 0.1 pCi/kg wet (4015)
Mixed plankton from 65 miles off Newport, Ore.: 0.55 ± 0.02 dpm/g wet(4193) in 1968
Polychete worms from 24 miles off Newport, Ore. in 1968: 17.83 ± .07 dpm/g wet (4193)
Albacore off Calif. in 1965: 134 ± 6.0 pCi/kg wet (4015)
Tuna meat in 1961: 2.0 pCi/kg wet (4015)
Bonito off Calif. in 1965: 9.5 pCi/kg wet (4015)
Squid off Calif. in 1965: 147 ± 2.0 pCi/kg wet (4015)

Work on uptake, retention, distribution, turnover and food chains: Although ^{210}Po is closely related to ^{210}Pb in the ^{238}U decay chain, most oceanic organisms concentrate ^{210}Po to a greater extent than ^{210}Pb (4015,4193). Relatively high concentrations of ^{210}Po are found in organisms living in contact with the bottom and also in animals feeding on bottom living organisms (4190).

POTASSIUM

Radioisotope	Half-life	Emissions	Decay Product
^{40}K	1.26×10^9 years	(EC) γ β^-	^{40}A 11% (4043) ^{40}Ca 89%

Source: Naturally occurring; 0.0119% of natural K is ^{40}K (4208, 4207)

Prescribed MPC in drinking water: None (4008)

Recommended MPC in sea water: None

Coastal water concentrations: The ^{40}K activity is dependent on the total amount of potassium present in the water, which is related to the salinity. At a salinity of 35‰ the ^{40}K level is calculated to be 330 pCi/l (4050). In areas along the coast the salinity and ^{40}K activity is reduced by dilution from river runoff. During June 1963 values in sea water near the Columbia River ranged from 190 - 370 pCi/l (4050).

Oceanic water concentrations: Potassium-40 is the most abundant natural radionuclide present in sea water and accounts for about 97% of oceanic radiation (4048,4209). The ^{40}K concentration for the world ocean is reported to be 350 pCi/l (4097).

Biological importance: Potassium is an important element in living material and is often present in relatively large amounts. The majority of beta activity present in marine organisms is thought to be due to ^{40}K (4119).

Reported values in marine biological samples: Values are given for euphausiids, copepods, sergestids, viper fish, and salps collected during 1960-1962 between 15 and 125 miles off Astoria, Newport and Coos Bay in Osterberg (4069).

Values are given for coastal organisms collected between June 1961 and July 1963 by Toombs (4143).

Work on uptake, retention, distribution, turnover and food chains: Because ^{40}K is naturally occurring and present in marine organisms, other isotopes of potassium are used in biological tracer studies. A commonly used isotope is ^{42}K.

Laboratory uptake studies of ^{42}K by lobsters and prawns (4175).

Concentration factors of ^{42}K for marine algae, marine invertebrates, marine vertebrates, and crabs (4100).

RADIUM

Radioisotope	Half-life	Emissions	Decay Product
^{226}Ra	1602 years	α γ	^{222}Rn (4043)
^{228}Ra	6.7 years	β^-	^{228}Ac

Source: ^{226}Ra is the daughter of ^{230}Th in the decay chain of natural ^{238}U.
^{228}Ra is the daughter of ^{232}Th in the decay chain of natural ^{232}Th. (4043,4207)

Prescribed MPC in drinking water: ^{226}Ra - 3 x 10^{-5} µCi/kg (4008)
^{228}Ra - 3 x 10^{-5} µCi/kg
Recommended MPC in sea water: ^{226}Ra - 1.1 x 10^{-5} µCi/kg (4044)

Coastal water concentrations:

Oceanic water concentrations: At 350 miles off Newport, Oregon, in June 1967 the ^{226}Ra concentration was 110 dpm/1000 l (0.050 pCi/l) at 20 m depth and decreased to a minimum of 43.4 dpm/1000 l (0.022 pCi/l) at 328 m and then increased to 132.7 dpm/1000 l (0.060 pCi/l) at 1639 m. The majority of the activity was in the soluble fraction and the surface values were nearly doubled in an area of high productivity (4188).

The radium concentration in the Pacific is reported to increase to a maximum at about 4 km in depth (4097). The concentrations of ^{226}Ra/l and ^{228}Ra in sea water are reported to be 0.036 - 1.25 pCi ^{226}Ra/l and 0.0023 pCi ^{228}Ra/l (4126).

Pertsov (4097) calculates the ^{226}Ra concentration in the world ocean to be 0.3 pCi/l.

The amount of ^{226}Ra in most sea water samples is within a factor of 2 of 0.7×10^{-13} g/l (4187).

Biological importance: Reported concentration factor of ^{226}Ra in sea food is 2×10^{2} (4044). As is the case of other naturally-occurring radionuclides, ^{226}Ra and ^{228}Ra form a part of the radiation environment in which the biosphere has evolved.

RUTHENIUM

Radioisotope	Half-life	Emissions	Decay Product
^{103}Ru	39.5 days	β^{-} γ	^{130}Rh (4043)
^{106}Ru	368 days	β^{-}	^{106}Rh

Source: ^{103}Ru and ^{106}Ru are both fission products present in the northeastern Pacific as a result of fallout (4050,4093).

Prescribed MPC in drinking water: ^{103}Ru - 8×10^{-2} μCi/kg (4008)
^{106}Ru - 1×10^{-2} μ Ci/kg

Recommended MPC in sea water: ^{103}Ru - 1.6×10^{-5} μCi/kg (4044)
^{106}Ru - 2.0×10^{-6} μCi/kg

Coastal water concentrations: The average ^{103}Ru concentration at the mouth of the Columbia River from Nov. 1961-June 1962 was 0.79 pCi/l with a maximum of 2.5 pCi/l

Oceanic water concentrations: At 350 miles off Newport, Oregon, in June 1967 the ^{106}Ru concentration was 81 dpm/1000 l (~0.037 pCi/l) at 20 m depth and rapidly decreased with depth to 1.7 dpm/1000 l ($\sim 8 \times 10^{-4}$ pCi/l) at 656 m. The majority of the activity was in the soluble fraction and the surface activity was three times as high in an area of high productivity (4188).

Biological importance: The reported concentration factor of ^{103}Ru and ^{106}Ru in sea food is 5×10^{4} (4044).

Ruthenium-103 and -106 have little apparent significance in the metabolism of marine organisms and are accumulated mainly through sorption processes (4126).

Reported values in marine biological samples: $^{103-106}Ru$ measured in copepods, euphausiids, salps, fish, sergestids, and viper fish collected 15-125 miles off Astoria, Newport, and Coos Bay during 1960-1962 (4069,4070,4074).

^{103}Ru measured in various marine organisms from the Oregon coast have been separated by Toombs and Cutler (4094,4143,4196).

Concentrations of ^{103}Ru - ^{106}Ru in pCi/g drained weight (from Toombs, et. al. - 4196)

	Astoria	Tillamook	Yaquina	Winchester	Coos Bay
Clam *Mya*		12/61-7/63 0.1-1.6		2/62-10/62 0.1-0.3	
Oyster		2/62-7/63 0.1-0.9	4/62 0.2		2/63 0.6
Dungeness crab	3/62-7/62 0.08-0.6	2/62-5/63 0.04-0.4	12/62 0.1		

Work on uptake, retention, distribution, turnover rates and food chains: Laboratory uptake of ^{106}Ru by foraminiferans (4156).

Laboratory uptake of ^{106}Ru by nitrosyl by various marine organisms (4162). Seaweeds accumulate ^{106}Ru mainly by surface adsorption. Diatoms accumulate ^{106}Ru mainly by surface adsorption. Majority of uptake in *Mytilus* was by the shell. For fish some ^{106}Ru was found in the liver and spleen but very little in the muscle.

In environmental samples of sea weeds ^{106}Ru was absorbed or metabolicly fixed (4186).

Laboratory uptake of two chemical forms of ^{106}Ru by *Mytilus* (4163, 4164). Incorporation of $^{106}Ru/Cl$ was 10 times greater than that of $^{106}Ru/N$ with the internal soft parts taking up more than the shell.

Laboratory uptake and retention of ^{106}Ru by marine fish (4185,4096).

Laboratory retention of ^{106}Ru by sea urchin larvae (4096).

RUBIDIUM

Radioisotope	Half-life	Emission	Decay Product
^{86}Rb	18.66 days	β^- γ	^{86}Sr (4043)
^{87}Rb	4.8×10^{10} years	β^-	^{87}Sr

Source: ^{86}Rb is produced by neutron induction in the reaction $^{85}Rb(n\gamma)^{86}Rb$ (4043). ^{87}Rb is naturally occurring (4207).

Prescribed MPC in drinking water: $^{86}Rb - 7 \times 10^{-2}$ μCi/kg (4008)
$^{87}Rb - 1 \times 10^{-1}$ μCi/kg
Recommended MPC in sea water: $^{86}Rb - 1.0 \times 10^{-3}$ μCi/kg (4044)

Coastal water concentrations: The specific activity of ^{87}Rb in the environment is 42.2 ± 0.7 dpm/mg Rb or ~ 19.2 nCi ^{87}Rb/g Rb (4207).

Oceanic water concentrations: The ^{87}Rb concentration in sea water is reported to be 2.8 pCi/l (4126). A rubidium concentration of 120 μg/l is equal to a ^{87}Rb activity of 2.9 pCi/l (4187). Pertsov (4097) has calculated the average concentration of ^{87}Rb in the world ocean to be 6 pCi/l.

Biological importance: Reported concentration of ^{86}Rb in sea food is 2×10^2 (4044). As with other naturally-occurring radioisotopes, ^{87}Rb constitutes a part of the radiation background under which organisms have evolved.

SILVER

Radioisotope	Half-life	Emissions	Decay Product
^{110m}Ag	255 days	β^- γ	^{110}Cd (4043)

Source: Neutron induced in reaction $^{109}Ag(n\gamma)^{110m}Ag$ during nuclear weapons testing (4043, 4125).

Prescribed MPC in drinking water: 3×10^{-2} μCi/kg (4008)

Coastal water concentrations:

Oceanic water concentrations:

Biological importance:

Reported values in marine biological samples: ^{110m}Ag in liver of squids from Monterey, California coast was 300 ± 100 pCi/kg wet (4053).

^{110m}Ag in oysters at Bradwell, Essex (4042).

SODIUM

Radioisotope	Half-life	Emissions	Decay Product
^{22}Na	2.62 years	β^+(EC) γ	^{22}Ne (4043)

Source: Cosmic ray produced (4045).

Prescribed MPC in drinking water: 4×10^{-2} μCi/kg (4008).

Recommended MPC in sea water: 1.0×10^{-1} μCi/kg (4044).

Coastal water concentrations:

Oceanic water concentrations:

Biological importance: In shrimp and fish all of the sodium is quickly exchangeable (4160).

Work on uptake, retention, distribution, turnover rates and food chains: Laboratory study of ^{22}Na metabolism in shrimp, mussels, and fish (4160).

Laboratory uptake and retention studies of ^{22}Na by fish were carried out by Keckes (4161).

STRONTIUM

Radioisotope	Half-life	Emissions	Decay Product
^{89}Sr	52.7 days	β^-	^{89}Y (4043)
^{90}Sr	27.7 years	β^-	^{90}Y

Source: ^{89}Sr is a fission product and also is induced in reaction $^{88}Sr(n\ \gamma)^{89}Sr$ and present in fallout (4043;4207;4050). ^{90}Sr is a fission product present in fallout (4043,4207,4050).

Prescribed MPC in drinking water: ^{89}Sr - 3×10^{-2} µCi/kg (4008)
^{90}Sr - 3×10^{-4} µCi/kg

Recommended MPC in sea water: ^{89}Sr - 8.7×10^{0} µCi/kg (4044)
^{90}Sr - 3.4×10^{-2} µCi/kg

Coastal water concentrations: Strontium-90 is believed to remain mostly in solution in the ocean (4169,4126).

In July 1964 Columbia River water had higher ^{90}Sr values than ocean water. The location of sampling and ^{90}Sr values of Park et. al. are as follows (4077):

Columbia estuary (Warrenton)	0.65 pCi/l
About 10 miles off Col. mouth	0.69 pCi/l
Coast at Nehalem, Oregon	0.51 pCi/l
Coast at Newport, Oregon	0.21 pCi/l

Summer samples of water from the Lower California coast during 1964 ranged from 0.055 - 0.097 pCi/l. The coastal concentrations were much lower than offshore values (4015).

Oceanic water concentrations: The ^{90}Sr concentration 250 miles off Oregon coast in January 1962 was 0.04 pCi/l (4050). Samples collected offshore from lower California during the summer of 1964 were between 0.19 - 0.57 pCi/l. At 500 m depth the ^{90}Sr concentration was only about 10% of that at the surface (4015).

Generally little ^{90}Sr is present below 300 m depth (4085).

Biological importance: Reported concentration factor of ^{89}Sr and ^{90}Sr in sea food is 2×10^1 (4044).

Strontium is a bone seeker and interchangeable with calcium in organisms (4009,4155).

However most marine organisms discriminate against strontium in favor of calcium (4126,4168).

Harmful effects were observed in fish maintained in sea water containing a ^{90}Sr - ^{90}Y concentration of 10^{-10}Ci/l = 100 pCi/l (4081).

Reported values in marine biological samples:

Work on uptake, retention, distribution, turnover rates and food chains: Uptake of ^{90}Sr by marine microrganisms (4109).

Uptake and retention of ^{90}Sr by marine phytoplankton (4110,4112,4113)

Laboratory uptake of 90Sr by algae (4096,4172,4173). Brown algae concentrates ^{90}Sr but red and green algaes took up very little.

Laboratory uptake of ^{90}Sr by foraminiferans (4156).

Laboratory uptake of ^{90}Sr by Artemia is mainly directly from the water (4170).

Laboratory uptake of ^{90}Sr by molluscs and polychaetes (4166). Uptake is mainly directly from the water.

Uptake of ^{89}Sr by oysters and distribution of ^{89}Sr in mussels (4096).

Laboratory uptake of ^{90}Sr by the eel (4171).

Uptake of strontium by marine fish (4105,4106,4108,4168). Temperature affects ^{89}Sr uptake by larval flat fish (4096). ^{90}Sr taken up from water by fish was found to be concentrated in the bones and scales (4185,4155).

Distribution of strontium in tuna, mackerel, and dolphin (4107,4155).

Laboratory uptake of ^{85}Sr by phytoplankton, copepods, oysters, clams, scallops, and fish (4155).

Concentration factors of ^{89}Sr in various marine organisms are given by Hiyama (4062).

THORIUM

Radioisotope	Half-life	Emissions	Decay Product
^{227}Th	18.2 days	α γ	^{223}Ra (4043)
^{228}Th	1.91 years	α γ	^{224}Ra
^{230}Th	8.0×10^4 years	α γ	^{226}Ra
^{232}Th	1.41×10^{10} years	α γ	^{228}Ra

Source: ^{227}Th - daughter of ^{227}Ac in decay chain of natural ^{235}U. (4043,4207)
^{228}Th - daughter of ^{228}Ac in decay chain of natural ^{232}Th.
^{230}Th - daughter of ^{234}Pa in decay chain of natural ^{238}U.
^{232}Th - occurs naturally and is head of thorium series.

Prescribed MPC in drinking water: ^{227}Th - 2×10^{-2} μCi/kg (4008)
^{228}Th - 7×10^{-3} μCi/kg
^{230}Th - 2×10^{-3} μCi/kg
^{232}Th - 2×10^{-3} μCi/kg

Coastal water concentrations:

Oceanic water concentrations: At 350 miles off Newport, Oregon, in June 1967 the ^{228}Th concentration was 3 - 3.5 dpm/1000 l ($\sim$0.0013 - 0.0016 pCi/l) from 20 m to 328 m and $<$ 0.5 dpm/1000 l deeper than 328 m. The majority of the activity was in the soluble fraction and surface values were nearly doubled in an area of high productivity (4188).

The concentrations of ^{227}Th, ^{228}Th, ^{230}Th, and ^{232}Th in sea water are reported to be $<0.2 - 1.2 \times 10^{-2}$ pCi ^{227}Th/l, $0.25 - 1.4 \times 10^{-2}$

^{228}Th /1, 0.4 - 1.2 x 10^{-2} pCi ^{230}Th/1, and 0.02 - 1.0 x 10^{-2} pCi ^{232}Th/1 (4126).

Pertsov (4097) calculates the concentration of ^{232}Th in the world ocean to be 0.5 x 10^{-2} pCi/l.

In the Atlantic ocean the activity ratio of ^{228}Th/^{232}Th is about 15 at all depths (4067).

Biological importance: All thorium radionuclides are naturally-occurring and contribute to the radiation background of the biosphere.

URANIUM

Radioisotope	Half-life	Emissions	Decay Product
^{234}U	2.47 x 10^{5} years	α γ	^{230}Th
^{235}U	7.1 x 10^{8} years	α γ	^{231}Th (4043)
^{238}U	4.51 x 10^{9} years	α γ	^{234}Th

Source: Both ^{235}U and ^{238}U are from a natural source (4043). ^{234}U is the daughter of ^{234}Pa in the decay chain of ^{238}U (4207).

Prescribed MPC in drinking water: ^{234}U - 3 x 10^{-2} μCi/kg
^{235}U - 3 x 10^{-2} μCi/kg (4008)
^{238}U - 4 x 10^{-2} μCi/kg

Recommended MPC in sea water: ^{235}U - 1.0 x 10^{-4} μCi/kg (4044)
^{238}U - 1.7 x 10^{-5} μ Ci/kg

Coastal water concentrations:

Oceanic water concentrations: The uranium concentration in the Pacific Ocean increases to a maximum of approximately 1 km depth (4097). In the east Pacific the uranium content is reported to be 2.49 μg/l (4187). The average concentration in well mixed sea water is reported to be 3.3 μg/l = 2.2 pCi/l (Sugimura 4095; Burton 4187). Pertsov (4097) has calculated the ^{235}U and ^{238}U concentration in the world ocean to be 0.08 pCi ^{235}U/l and 3 pCi ^{238}U/l.

Biological importance: ^{238}U contributes most of the alpha radiation in sea water (4048).

Reported concentration in sea food is less than 1×10^1 (4044).

YTTRIUM

Radioisotope	Half-life	Emissions	Decay Product
^{90}Y	64.0 hours	β^-	^{90}Zr (4043)
^{91}Y	58.8 days	β^-	^{91}Zr

Source: ^{90}Y - daughter of ^{90}Sr (4043)
^{91}Y - fission product (4009)

Prescribed MPC in drinking water: ^{90}Y - 2×10^{-2} μCi/kg
^{91}Y - 3×10^{-2} μCi/kg (4008)

Recommended MPC in sea water: ^{91}Y - 7.0×10^{-2} μCi/kg (4044)

Coastal water concentrations:

Oceanic water concentrations:

Biological importance: Reported concentration factor for ^{91}Y in sea food is 1×10^3 (4044). Relatively low levels are accumulated from sea water by marine fishes (4185). Harmful effects were observed in fish maintained in sea water containing a ^{90}Sr-^{90}Y concentration of 10^{-10} c/l (100 pCi/l) (4081).

Reported values in marine biological samples:

Work on uptake, retention, distribution, turnover and food chains: Removal of ^{90}Y from sea water by microorganisms (4109). Laboratory uptake and exchange of ^{90}Y by phytoplankton (4110,4113).

Laboratory uptake of ^{90}Y from sea water by algae (4173). Many species of algae concentrate ^{90}Y over ^{90}Sr (4009,4096).

In general the red and green algae concentrated ${}^{90}Y$ but very little was taken up by the brown algae (4172).

Laboratory uptake by Artemia show ${}^{90}Y$ is preferred over ${}^{90}Sr$ (4170).

Laboratory uptake of ${}^{90}Y$ and ${}^{91}Y$ by an eel (4171).

Laboratory uptake by marine fish (4111,4185).

ZINC

Radioisotope	Half-life	Emissions	Decay Product
${}^{65}Zn$	245 days	$(EC)\gamma, \beta^{+}$	${}^{65}Cu$ (4043)

Source: Neutron induced by reaction ${}^{64}Zn(n\ \gamma\ ){}^{65}Zn$ in nuclear tests and reactors. Some ${}^{65}Zn$ occurs in fallout, but the major source in the northeast Pacific comes from coolant waters of Hanford Atomic Products which are expelled into the Columbia River (4043,4069,4049).

Prescribed MPC in drinking water: 1×10^{-1} μCi/kg (4008)

Recommended MPC in sea water: 1.2×10^{-5} μCi/kg (4044)

Coastal water concentrations: By the time ${}^{65}Zn$ from Hanford reaches the ocean it is largely associated with sediment particles (4035). At the Columbia River mouth the average concentration of ${}^{65}Zn$ remaining in solution from January 1961 to September 1961 and November 1961 to June 1962 were 21 pCi/l and 5.1 pCi/l respectively (4050).

The background ${}^{65}Zn$ concentration in coastal water off lower California, out of the Columbia River influence, was estimated to be 0.45 pCi/l using ${}^{65}Zn$ concentrations found in organisms and reported concentration factors. Compiled data from lower California indicate that levels of ${}^{65}Zn$ from fallout have established a relatively constant specific activity in the coastal environment equal to 0.05 - 2.69 pCi 65Zn/mg Zn (4019).

The amount of ^{65}Zn discharged into the Pacific by the Columbia River depends on the number of reactors in operation at Hanford.

Upon entering the ocean some of the particle-bound ^{65}Zn is displaced by the sea water, but the remainder has little tendency to displace even after long exposure time (4031). In sediment samples collected near the Columbia River mouth ^{65}Zn was abundant with 1963 values ranging from 10-50 pCi/g dry wt (4034,4037). In 1963, sediments containing detectable quantities of ^{65}Zn were reported to cover an area of 2,600 km^2 on the Continental Shelf near the river mouth and in Willapa Bay (4035).

Oceanic water concentrations: Concentrations of ^{65}Zn in Pacific Ocean waters adjacent to Washington and Oregon vary with season, position of the Columbia River "plume" of fresh water, and operations of the Hanford Atomic Energy Works. A typical value for ^{65}Zn in unfiltered "plume" water 50 nautical miles offshore from Newport, Oregon in June 1965 was 120 pCi/l.

Biological importance: Of the radionuclides from Hanford which reach the ocean, ^{65}Zn is probably the most important biologically. It is concentrated greatly by most marine organisms and has been found in sufficient quantities to be detected readily in nearly all marine organisms collected near the Columbia River (4032,4033, 4069,4071,4072,4074,4010). The activity levels present constitute no health hazard to man, but provide a useful tool in ecological studies (4049). A reported concentration factor of ^{65}Zn in sea food is 5×10^3 (4044).

Zinc-65 is also important because it has been found in the discharge water of some nuclear steam electric plants (4041,4194).

Five years after the Bravo event, a nuclear explosion in the South Pacific, ^{65}Zn was one of the principle radionuclides in marine organisms (4148).

Reported values in marine biological samples: The direction the Columbia River plume moves is determined by the prevailing winds and currents along the Washington, Oregon, and California coasts. In the winter the plume moves northward and onshore while in the summer it travels southward and offshore (4035,4093,4102).

This change of direction has a large influence on the levels of ^{65}Zn present in marine organisms throughout the year.

The distribution of mean ^{65}Zn values for unsorted plankton caught in #6 mesh net off the Washington and Oregon coast between January 1961 and December 1963 as given by Lewis and Seymour (4010):

	pCi/g wet weight			
Location	Winter	Spring	Summer	Autumn
Nearshore Washington coast	200	160	29	19
Offshore from mouth	130	200	110	36
Nearshore Oregon coast	62	160	69	41

Maximum ^{65}Zn values occurred in winter off the Washington coast. In the spring values increased off the Columbia River mouth and southward and in the southern offshore area reached a maximum in the summer. The autumn season was characterized by minimum values in all areas.

The ^{65}Zn levels in intertidal organisms generally decrease with distance from the Columbia River. The average ^{65}Zn concentrations in mussels collected from 1961-1963 are given by Seymour and Lewis (4093):

Location	Distance from Columbia	pCi ^{65}Zn/g wet
Cape Flattery	150 miles	12
Hoh Head	110	30
Kala Loch	90	22
Copalis Rocks	70	33
Westport	45	50
North Head	0	97
North Jetty	0	95
Cannon Beach	25	32
Nehalem	40	25
Barview	50	10
Agate Beach	110	10
Coos Bay	200	5

Seymour and Lewis (4093) showed that the distance from the Columbia River where ^{65}Zn activity in mussels decreased to one-half that found at the mouth was 32.2 km to the south and 64.4 km to the north. In a similar study on mussels in 1966, Mellinger (4128) found the distance to be 24 km to the south and 96.5 km to the north. Mellinger found that ^{65}Zn values in mussels collected 322 km south of the Columbia River mouth had still not decreased to 10% of that found at the mouth. The ^{65}Zn concentration in mussels at La Jolla, California, out of the Columbia River influence, was 31 - 36 pCi/kg wet in 1963 (4027).

		pCi/g wet weight		
Location	Year	Algae	Mussel	Razor Clam
Illwaco, Wa.	1957	27	28	
Illwaco, Wa.	1959	110	100	
Illwaco, Wa.	1960	90	147	
Long Beach, Wa.	1957			10
Long Beach, Wa.	1959			19
Long Beach, Wa.	1960			24
Seaside, Or.	1959		38	21
Seaside, Or.	1960			17

Values of ^{65}Zn in algae, mussels, oysters, and razor clams collected from Washington and Oregon coast in 1957, 1959, and 1960 are given by Watson, Davis and Hanson (4022).

Values of ^{65}Zn in euphausiids, salps, sergestids, viperfish and other fish collected 15-125 miles off Astoria, Newport, and Coos Bay during 1960-1962 are given by Osterberg (4069).

^{65}Zn concentration in euphausiids collected within 10 miles of Astoria in 1962 was 46.7 pCi/g freeze dried wt. Other values for euphausiids collected farther than 10 miles offshore are given by Osterberg, et al. (4032, 4033, 4074).

^{65}Zn values reported for coastal organisms by Setser and Razzell (4007) are:

Tillamook Bay clams	2.5 pCi/g live wt (flesh and body fluids)
Tillamook Bay crab meat	15 pCi/g live wt
Tillamook Bay oysters	20 pCi/g live wt
Astoria crab meat	19 pCi/g live wt

^{65}Zn values are reported for coastal organisms by Toombs et al. (4143,4196,4094).

The ^{65}Zn values of marine organisms collected near La Jolla, California, ranged between 0.01 - 0.2 pCi/g fresh wt. (4029).

The ^{65}Zn concentration of Grays Harbor oysters collected on March 24, 1964 ranged from 28.8 - 86.3 pCi/g wet wt (4129).

Values of ^{65}Zn in juvenile coho salmon collected at sea from Washington to the Alaskan Gulf ranged from 5.8 - 7.0 pCi/g ash in 1967. Fish collected in 1968 generally had lower values but had a range of 0.8 - 129.8 pCi/g ash (4134).

Zinc-65 levels in salmon viscera, herring, and anchovies collected in the summer of 1964 are reported by Kujala (4114) as follows:

			pCi/g dry wt.	
Species	St. of Juan de Fuca	Astoria	Depoe Bay	Eureka
Chinook	44.88	49.15	81.87	
Sockeye	2.28			
Coho	43.71	59.28	44.98	
Herring			52.28	
Anchovies			52.76	43.04

Albacore tuna collected offshore had ^{65}Zn levels in their livers ranging from 10 - 100 pCi/g ash. Off Oregon, values increased during July through September to about 10 times higher than those in early July (4146).

The ^{65}Zn specific activity in Pacific hake collected in April 1969 ranged from 0.0098 μC ^{65}Zn/g Zn in the skin to 0.0925 μCi ^{65}Zn/g Zn in the spleen. These values are less than those reported in the previous year (4132).

Work on uptake, retention, distribution, turnover tates, and food chains: Laboratory uptake studies of ^{65}Zn in diatoms were reported by Bernhard (4127).

Laboratory uptake and retention of ^{65}Zn by benthic algae was followed by Gutknecht (4059) who reported that increasing pH promoted uptake and retarded loss of ^{65}Zn in some marine benthic algae.

Uptake of ^{65}Zn by marine benthic algae was studied by Bachmann and Odum (4124).

Uptake of ^{65}Zn by phytoplankton was examined by Chipman (4155), who also studied ^{65}Zn uptake and accumulation by marine plankton, fish, and shellfish (4051).

Transfer of ^{65}Zn through a laboratory food chain of phytoplankton, brine shrimp, post-larval fish, and mummichog was studied by Baptist and Lewis (4153). Uptake from food was a generally more efficient pathway by all trophic levels except the second.

Uptake of ^{65}Zn by foraminiferans (4156).

Elimination rates of ^{65}Zn calculated for copepods, pyrosoma, sagitta, euphausiids, and pteropods (4157).

Laboratory uptake and retention of ^{65}Zn by marine amphipods was studied by Cross (4151), who concluded that accumulation is temperature dependent.

Laboratory uptake and retention of ^{65}Zn by Euphausia pacifica was followed by Fowler (4198,4144), who observed increased accumulation with increased temperature.

Distributional studies of ^{65}Zn in amphipods and euphausiids by Cross (4133) showed that the exoskeleton was the predominant site of localization.

Laboratory uptake of ^{65}Zn and the effects of EDTA on uptake by shrimp (4130).

Laboratory study of ^{65}Zn turnover in the shore crab and lobster (4131).

Field and laboratory studies on retention of ^{65}Zn by the salt marsh snail, Littorina irrorata, (4121,4122).

Laboratory uptake of ^{65}Zn by mussels in the presence of EDTA (4147).

An environmental retention study of ^{65}Zn in the mussel Mytilus californianus by Young and Folsom (4027) showed the effective half-life was 58 days with a biological half-life of 82 days.

Environmental uptake and retention studies of ^{65}Zn in oysters indicate that for the first 60 days accumulation ranged from 1/2 - 2 pCi/g (dry)/day; after 200 days the rate was about 1/4 pCi/g (dry)/day. Steady state was not reached until after 500 days. Loss rates were relatively constant at about 0.55%/day. The effective half-life was 125 days with a biological half-life of 255 days (4123).

Uptake studies of ^{65}Zn by oysters by Skauen (4139) suggest that temperature had no effect on uptake rate.

Laboratory uptake and retention studies of ^{65}Zn by hard clams, oysters, and bay scallops (4176).

Environmental ^{65}Zn specific activity in shrimp and sculpin from the Columbia River estuary show season variation with the peak values during the summer (4135).

Field and laboratory studies of ^{65}Zn retention by the flounder (4199, 4138). Field study gave an ecological half-life of 139 days and laboratory study gave effective half-lives of 56-162 days.

Laboratory uptake studies of ^{65}Zn in the flounder by Hoss (4145) showed that higher levels of ^{65}Zn were concentrated from food than from water.

Laboratory uptake of ^{65}Zn in fish was followed by Townsley (4140), who concluded that accumulation was directly from the water by ingestion or through the gills.

Laboratory retention studies of ^{65}Zn in fish by Schulman (4141) produced an inverse relationship between temperature and excretion rate.

Environmental levels of ^{65}Zn in fish show that omnivorous and carnivorous fish both concentrate ^{65}Zn (4149).

Pearcy (4078) found zinc-65 in pelagic animals from all depths to be fairly constant as the result of a long biological half-life for ^{65}Zn.

Measurements of ^{65}Zn reservoirs in the Columbia River estuary (4150) indicate that surface sediments are by far the major reservoir of ^{65}Zn in the estuary.

In a field study of the flux of ^{65}Zn through a salt marsh ecosystem Pomeroy et al. (4200) showed that sediments and bacteria in the sediment take up ^{65}Zn rapidly, but transfer it to the biota slowly.

Uptake and retention of ^{65}Zn in man from consuming Columbia River fish resulted in highest body burdens after 104 days (4023,4016). Of the ^{65}Zn ingested 32 - 35% was retained with an effective half-life of 162 days. Ninety percent of the ^{65}Zn eliminated was in the feces.

Concentration factors of ^{65}Zn in various marine organisms are given by Hiyama (4062), McKee and Wolf (4100), Seymour (4123), and Mauchline and Templeton (4126).

ZIRCONIUM and NIOBIUM

Radioisotope	Half-life	Emissions	Decay Product
^{95}Zr	65.5 days	β^- γ	^{95}Nb (4043)
^{95}Nb	35 days	β^- γ	^{95}Mo

Source: ^{95}Zr is a fission product and occurs in the Northeastern Pacific as a result of nuclear weapons testing (4057,4072,4093). ^{95}Nb is the daughter of ^{95}Zr (4043).

Prescribed MPC in drinking water: ^{95}Zr - 6×10^{-2} μCi/kg (4008)
^{95}Nb - 1×10^{-1} μCi/kg (4008)

Recommended MPC in sea water: ^{95}Zr - 6.0×10^{-4} μCi/kg (4044)
^{95}Nb - 5.0×10^{-3} μCi/kg (4044)

Coastal water concentrations: When reporting activity levels, ^{95}Zr and ^{95}Nb are generally considered as if they were one radionuclide because with most routine counting techniques it is not possible to distinguish between the two and, if ^{95}Zr is present, ^{95}Nb will result from its decay (4057,4072,4050).

Except near the Columbia River mouth, concentrations of ^{95}Zr-^{95}Nb in surface coastal waters is greatly reduced (< 4 pCi/l) compared to oceanic values (4035,4057). Columbia River water has higher ^{95}Zr-^{95}Nb concentrations because the fresh river water remains as a lens and is not rapidly mixed (4035). The average ^{95}Zr-^{95}Nb concentration at the mouth of the Columbia River from Nov. 1961 to June 1962 was 4.5 pCi/l with a maximum of 16 pCi/l (4050).

Because ^{95}Zr-^{95}Nb are the result of fallout and have relatively short half-lives, the amount of nuclear testing and physical decay greatly affect their concentration in sea water. After the cessation of atmospheric testing in 1963 the ^{95}Zr-^{95}Nb in benthic organisms rapidly decreased (4049).

Oceanic water concentrations: The concentration of ^{95}Zr-^{95}Nb in oceanic waters is generally greater than that in coastal waters (4035,4057).

Biological importance: Zr is not important to biological functions and is not retained by organisms for any significant time (4049). In oceanic samples, ^{95}Zr-^{95}Nb was concentrated by primary producers and herbivores, not carnivores (4072). Its presence in both surface and bottom organisms suggests a rapid transfer to the bottom (4049,4071).

Reported values in marine biological samples:

Organism	Bay	Date	Conc. of ^{95}Zr-^{95}Nb
Clam *Mya*	Tillamook	Dec. 61-Jul 63	0.2-4.4 pCi/g wet wt.
Clam *Mya*	Winchester	Feb 62-Oct 62	0.3-1.2
Oysters	Tillamook	Feb 62-Jul 63	<0.1-0.6
Oysters	Yaquina	Apr 62	0.3 (4143)
Oysters	Coos Bay	Feb 63	0.4
Dungeness Crab	Astoria	Mar 62-Jul 63	<0.1-0.5
Dungeness Crab	Tillamook	Feb 62-May 63	<0.09-1.4
Dungeness Crab	Yaquina	Dec 62	<0.1
Euphausiids	15 miles off		<10 pCi/g (4070)
Euphausiids	45-105 miles off		highest values (4070)

Work on uptake, retention, distribution, turnover and food chains: Transfer of ^{95}Zr-^{95}Nb to depth in the ocean is thought to be mainly through biological processes (4049,4070). However, the total reservoir of ^{95}Zr-^{95}Nb in oceanic animals is almost entirely restricted to the surface waters (4078).

In environmental samples ^{95}Zr-^{95}Nb was concentrated in primary producers and herbivores but decreased rapidly after these first two trophic levels (4049,4072).

Uptake of ^{95}Zr-^{95}Nb by fish is believed to be mainly through the gills (4171).

In offshore benthic organisms ^{95}Zr-^{95}Nb was found only in the sediment feeding organisms (4049).

APPENDIX 8. ANNOTATED CHECKLIST OF PLANTS AND ANIMALS

by James E. McCauley and Danil R. Hancock

This checklist has been compiled from the scientific literature and collection records available. Although every attempt was made to be exhaustive in our search of the literature, there are undoubtedly omissions. The authors assume full responsibility for these omissions and request that anyone finding such an oversight or other error will call it to their attention. Some species, dealt with more fully in the main body of this report, are included in this appendix and the reader is referred to the proper pages in Chapter 20, thus

See also Chapter 20
p. 246

The authors wish to acknowledge the assistance of Dr. Emory Sutton for collecting the information on the various phytoplankton groups, to Gary Gill for the macroalgae, to Nancy Blind for the fishes, to Diane Dean and Nancy Blind for much of the invertebrate information.

A number of abbreviations have been used in the annotations:

Dist:	Distribution
Hab:	Habitat
Coll:	Collection sites
Str&Repro:	Structure and reproduction
Tax:	Taxonomy
Ref:	General references
Desc:	Description
Repro:	Reproduction
Temp:	Temperature data
Econ:	Economics

TABLE OF CONTENTS

Page

Division CHRYSOPHYTA 175
    Order Bacillariales - Diatoms 175
        Suborder: Discineae 175
            Family Coscinodiscaceae 175
                Eupodiscaceae 179
                Actinodiscaceae 179
                Biddulphiaceae 180
                Chaetoceraceae 182
                Bacteriastaceae 187
                Corethronaceae 187
                Rhizosoleniaceae 187
                Leptocycindraceae 189
                Fragilariaceae 189
                Tabellariaceae 190
                Naviculaceae 191
                Bacillarlaceae 192
                Silicoflagellaceae 193

Division PYRROPHYTA 193

ALGAE - CHLOROPHYTA 196
ALGAE - PHAEOPHYTA 217
ALGAE - RHODOPHYTA 241

Division ANGIOSPERMAE 288

PHYLUM PROTOZOA 288
    Class: SARCODINA 288
        Order: Lobosa 288
            Suborder: Amoebaea 288
            Suborder: Conchulina 289
        Order: Reticulosa 289
            Suborder: Foraminifera 289
        Order: Heliozoa 303
            Suborder: Aphrothoracidae 303
            Suborder: Chalarothoracidae 304
        Order: Radiolaria 304
    Class: MASTIGOPHORA 305
    Class: CILIATA 316
    Class: SUCTORIA 325

PHYLUM PORIFERA 328

Page

PHYLUM COELENTERATA (CNIDARIA) 333
- Class: HYDROZOA 333
  - Order: A. Hydroida 333
    - Suborder: Calyptoblastea (Leptomedusa) 333
    - Suborder: Gymnoblasta 339
  - Order: Milleporina 342
  - Order: Trachylina 342
  - Order: Siphonophora 343
- Class: SCYPHOZOA 344
- Class: ANTHOZOA 446
- Class: INCERTAE SEDIS 449

PHYLUM CTENOPHORA 350

PHYLUM PLATYHELMINTHES 351
- Class: TURBELLARIA 351
- Class: TREMATODA 355
  - Order: Monogenea 355
  - Order: Digenea 355
- Class: CESTODA 358

PHYLUM NEMERTEA 358

PHYLUM ACANTHOCEPHALA 362

PHYLUM PRIAPULIDA 362

PHYLUM NEMATODA 362

PHYLUM ENTOPROCTA 364

PHYLUM ECTOPROCTA 365
- Class: CTENOSTOMATA 365
- Class: CYCLOSTOMATA 367
- Class: CHEILOSTOMATA 370

PHYLUM PHORONIDA 386

PHYLUM BRACHIOPODA 386

PHYLUM SIPUNCULOIDEA 387

PHYLUM ECHIUROIDEA 388

PHYLUM ANNELIDA 388
- Class: POLYCHAETA 388

Page
PHYLUM ARTHROPODA 440
Subphylum: CHELICERATA 440
Class: PYCNOGONIDA 440
ARACHNIDA 444
Subphylum: MANDIBULATA 445
Class: CRUSTACEA 445
Subclass: Branchiopoda 445
Ostracoda 446
Copepoda 446
Class: BRANCHIURA 462
Subclass: Cirripedia 462
Malacostraca 465
Order: Mysidacea 465
Cumacea 468
Tanaidacea 470
Isopoda 471
Suborder: Valvifea 471
Bopyroidea 473
Oniscoidea 474
Asellota 477
Flabellifera 479
Order: Amphipoda 482
Suborder: Gammaridea 482
Hyperiidea 492
Caprellidea 494
Order: Euphausiacea 495
Order: Decapoda 497
Class: INSECTA 512

PHYLUM CHAETOGNATHA 518

PHYLUM MOLLUSCA 520
Class: AMPHINEURA 520
SCAPHOPODA 527
PELECYPODA 528
Family: Nuculidae 528
Nuculanidae 528
Glycymerididae 530
Philobryidae 531
Mytilidae 531
Ostreidae 534
Pectinidae 535
Anomiidae 536
Chamidae 536
Asteridae 537

Page

PHYLUM MOLLUSCA continued

Family: Carditidae 537

Erycinidae 538

Kelliidae 538

Leptonidae 539

Montacutidae 539

Vesicomyacidae 540

Turtoniidae 540

Lucinidae 540

Thyasiridae 541

Diplodonidae 542

Ungulinidae 542

Cardiidae 542

Veneridae 543

Petricolidae 547

Cooperellidae 547

Mactridae 547

Tellinidae 549

Garidae 552

Semelidae 552

Solenidae 553

Myidae 554

Pholadidae 555

Teredinidae 557

Pandoridae 557

Lyonsiidae 557

Thraciidae 558

Poromyidae 558

Cuspidariidae 559

Laternulidae 559

Class: GASTROPODA 559

Subclass: Prosobranchia 559

Family: Acmaeidae 559

Lepetidae 564

Scissurellidae 665

Haliotidae 565

Fissurellidae 566

Trochidae 567

Carinariidae 571

Epitoniidae 572

Eulimidae 573

Cocculinidae 573

PHYLUM MOLLUSCA continued

		Page
Family:	Turbinidae	573
	Phasianellidae	574
	Littorinidae	574
	Lacunidae	576
	Assimineidae	577
	Rissoidae	577
	Turritellidae	578
	Caecidae	578
	Vermetidae	579
	Cerithiidae	579
	Litiopidae	581
	Hipponicidae	582
	Calyptraeidae	582
	Trichopidae	584
	Natieidae	584
	Lamellariidae	586
	Velutinidae	586
	Eratoidae	587
	Cymatiidae	587
	Muricidae	588
	Thaisidae	591
	Buccinidae	592
	Neptuneidae	593
	Columbellidae	595
	Nassariidae	597
	Fusinidae	598
	Mitridae	598
	Marginallidae	598
	Olividae	599
	Conidae	600
	Turridae	600
	Borosiinae	601
	Cochlespirinae	603
	Mangeliinae	604
Subclass: Opisthobranchia		605
Family:	Bullidae	605
	Atgidae	605
	Retusidae	605
	Philinidae	606
	Agilijidae	606
	Gastropteron	606
	Pyramidellidae	606

PHYLUM MOLLUSCA continued

		Page
Family:	Scaphandriadae	610
	Acteonidae	611
	Ringigulidae	611
	Pleurobranchidae	611
	Aplysiidae	612
	Hermaeidae	612
	Elysiidae	612
	Cavolinidae	612
	Clionidae	613
	Cymbaliidae	613
	Pheumodermatidae	614
	Desmopteriidae	614
	Limacinidae	614
	Spiratellidae	614
	Polyceridae	615
	Onchidoridinae	616
	Corambidae	617
	Dorididae	618
	Arminidae	621
	Dendrodoridiae	622
	Dendronatidae	622
	Duvauceliidae	623
	Fimbriidae	623
	Dironidae	624
	Okeniidae	624
	Zephyrinidae	625
	Fionidae	625
	Aeolidiidae	626
	Aeolidiinae	626
Subclass: Pulmonata		627
Family:	Ellobiidae	627
	Siphonaria	627
	Trimusculus	627
	Incertae sedis Onchidiidae	627
Class: CEPHALOPOD		628
PHYLUM ECHINODERMATA		631
Class: ASTEROID		631
ECHINOIDS		635
HOLOTHUROIDS		637
OPHIUROIDS		639
PHYLUM CHORDATA		641
Class: LARVACEA		641
ASCIDIACEA		641
THALLIACEA		645
AGNATHA		646

PHYLUM CHORDATA continued

Page
- Order: Myxiniformes 646
  - Family: Mixinidae 646
- Order: Petromyzontiformes 647
  - Family: Petromyzontidae 647
- Class: CHONDRICHTHES 647
- Order: Squaliformes 647
  - Family: Hexanchide 647
  - Lamnidae 648
  - Scyliorhinidae 648
  - Carcharhinidae 649
  - Squalidae 650
  - Squatinidae 650
- Order: Rajaformes 651
  - Family: Torpedinidae 651
  - Rajidae 651
  - Dasyatidae 652
  - Myliobatidae 653
- Order: Chimaeriformes 653
  - Family: Chimaeridae 653
- Class: OSTEICHTHYS 653
- Order: Acipenseriformes 653
  - Family: Acipensiridae 653
- Order: Clupeiformes 654
  - Family: Clupeidae 654
  - Engraulidae 656
  - Salmonidae 657
  - Osmeridae 660
  - Bathylagidae 662
  - Opisthoproctidae 662
  - Paralepidae 662
  - Anotopteridae 663
- Order: Mytophiformes 663
  - Family: Mytophidae 663
  - Alepisauridae 664
- Order: Anguilliformes 665
  - Family: Nemichthyidae 665
- Order: Beloriformes 665
  - Family: Scomberesocidae 665
  - Malacosteidae 666
  - Chaeliodontidae 666
- Order: Gadiformes 666
  - Family: Gadidae 666
- Order: Gasterosteiformes 668
  - Family: Gasterosteidae 668
  - Aulorhynchidae 668
  - Syngnathidae 668

PHYLUM CHORDATA continued

		Page
Order:	Lampidriformes	669
Family:	Lampridae	669
	Trachipteridae	669
Order:	Perciformes	670
Family:	Serranidae	670
	Coryphaenidae	670
	Bramidae	671
	Sciaenidae	671
	Embiotocidae	672
	Scombridae	776
	Gobiidae	678
	Scorpaenidae	679
	Anoplopomatidae	686
	Hexagrammida	687
	Zaniolepidae	689
	Cottidae	689
	Agonidae	701
	Cyclopteridae	704
	Trichodontidae	707
	Ammodytidae	708
	Bathymasteridae	708
	Clinidae	708
	Anarhichadidae	709
	Pholidae	709
	Stichaenidae	711
	Ptilichthyidae	715
	Zoarcidae	715
	Scytalinidae	717
	Zaproridae	717
	Brotulidae	717
	Stromateidae	717
	Tetragonuridae	718
	Icosteidae	718
	Sphyraenidae	718
	Atherinidae	719
Order:	Pleuronectiformes	719
Family:	Bothidae	719
	Pleuronectidae	720
Order:	Echeneiformes	725
Family:	Echeneidae	725
Order:	Gobiesociformes	726
Family:	Gobiesocidae	726
Order:	Tetradontiformes	726
Family:	Molidae	726
Order:	Batrachoidiformes	727
Family:	Batrachoididae	727
Class:	AVES	727
Class:	MAMMALIA	737

Division: CHRYSOPHYTA
Order: Bacillariales - Diatoms
Suborder: Discineae

Family: Coscinodiscaceae

Actinocyclus ehrenbergii - (7030)
Dist: Wash: Puget Sound (7030)

Coscinodiscus angstii Gran (1931) - (7029, p75)
Dist: Wash: Puget Sound (7017,pl03), (7030)
Hab: Temperate, neritic (7017,pl03); southerly, neritic (7029,p75)

Coscinodiscus centralis Ehrenberg - (7000,p60)
Dist: Temperate or north temperate species. Abundance not known, but not uncommon north to Alaska (7000, p61)
Coll: Wash: Puget Sound (7030),(7017,pl02); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Probably oceanic (7000, p61); oceanic (7029,p74)

Coscinodiscus concinnus - (7030)
Dist: Wash: Puget Sound (7030); Calif: (7000,p58)
Hab: Neritic (7000,p58)

Coscinodiscus curvatulus Grunow - (7000,p55)
Dist: Reported occasionally off Calif. Found in all oceans (7000,p55)
Coll: Wash: Puget Sound (7030)
Hab: Neritic (7000,p55)

Coscinodiscus excentricus Ehrenberg - (7000,p52)
Dist: Wide; common but never abundant off Calif. (7000,p52)
Coll: Alaska: inshore Alaskan waters (7028), Alaska (7029); Wash: Puget Sound (7017,pl02),(7030); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Oceanic (7029,p74) but often found near coast (7000,p52); temperate oceanic (7017,pl02)

Coscinodiscus granii Gough - (7029,p75);(7000,p56)
Dist: Widespread; not uncommon off Calif. Greatest abundance in Mission Bay near San Diego. North temperate or boreal species (7000,p57)
Coll: Alaska: (7029,p75); Wash: Puget Sound (7017,pl03), (7030)
Hab: Neritic (7000,p57); temperate neritic (7017,pl03); southerly neritic (7029,p75)

PHYTOPLANKTON - CHRYSOPHYTA - Coscinodiscaceae

Coscinodiscus lineatus Ehrenberg - (7000,p53)
Dist: Reported occasionally off Calif. Found in all oceans (7000,p53)
Hab: Chiefly oceanic but frequently neritic (7000,p53)

Coscinodiscus marginatus Ehrenberg - (7000,p55)
Dist: Wide; found in all oceans sporadically. Not common off Calif. (7000,p56)
Coll: Ore: Inshore stations, Columbia River (7010)

Coscinodiscus nitidus Greg. - (7029,p74)
Dist: Alaska to Calif.
Coll: Alaska: Scotch Cap Light (7029,p74); Calif: (7000,p55)
Hab: Temperate neritic (7029,p74) in coastal waters of all seas (7000,p55)

Coscinodiscus radiatus Ehrenberg - (7017,pl02)
Dist: Ubiquitous (7000,p56)
Coll: Alaska: inshore Alaskan waters (7028), Scotch Cap Light (7029,p74); Wash: Puget Sound (7030), (7017,pl02)
Hab: Oceanic, temperate (7017,pl02),(7029,p74); oceanic and neritic (7000,p56)

Coscinodiscus stellaris - (7014)
Dist: Wash. to Calif.
Coll: Wash: Puget Sound (7017,pl02), (7030); Calif: Trinidad Head-Eel River; north of Cape Mendocino (7014)
Hab: Oceanic, temperate (7017,pl02)

Coscinodiscus wailesii - (7030)
Dist: Not uncommon off Calif. (7000,p58)
Coll: Wash: Puget Sound (7030)

Coscinosira polychorda Gran - (7000,p44)
Dist: Widely; not uncommon off southern Calif, but never in large numbers (7000,p45)
Coll: Alaska: (7029,p74); Wash: Puget Sound (7017,pl03),(7030); Calif: Trinidad Head-Eel River; north of Cape Mendocino (7014)
Hab: Neritic. North temperate species (7000,p45), (7029,p74)

Melosira borreri - (7019)
Coll: Ore: Coos Bay region (7019)

PHYTOPLANKTON - CHRYSOPHYTA - Coscinodiscaceae

Melosira moniliformis (Müller) Agardh - (7000, p39)
Hab: Very common in littoral zone. Occurs in plankton accidentally (tychopelagic). Cold-water species.

Melosira sulcata (Ehrenberg) Kützing - (7000, p40)
Dist: Alaska to Calif.
Coll: Alaska: Scotch Cap Light (7029, p75); Wash: Puget Sound (7017, pl03); Calif: (7000, p40)
Hab: Neritic and littoral. Tychopelagic (7017, pl03), (7029, p75). Found occasionally in plankton catches off southern Calif. (7000, p40)

Planktoniella sol - (7023)
Dist: Wash. to Calif; not uncommon off southern Calif. (7000, p68)
Coll: Wash: Puget Sound (7030); S. Calif: (7023)

Skeletonema costatum (Greville) Cleve - (7000, p43)
Dist: Widely distributed in all seas. One of our most abundant species, particularly from Feb. through Apr. Recorded up to nearly 2,000,000 cells/liter (7000, p43); Wash. to Calif. (7020)
Coll: Alaska: (7026); Alaskan waters (7022)(7026)(7028); Wash: Puget Sound (7030)(7017, pl03); Ore: Coos Bay Region (7019); off Newport (7031); Calif: Trinidad Head-Eel River; north of Cape Mendocino (7014); S. Calif: (7021) (7023)
Hab: Neritic (7000, p43); temperate (7017, pl03) (7029, p75)
Note: Temp. inform. Grew 5°-25°C (7015) to 30°C (7008)
6°-28°+C (7009)

Stephanopyxis nipponica Gran and Yendo - (7000, p43)
Dist: North temperate or arctic species (7000, p43); never abundant.
Coll: Alaska: Scotch Cap Light (7029, p75); Wash: Puget Sound (7030) (7017, pl03); Ore: off Newport (7031)
Hab: Neritic (7000, p43) (7029, p75)

Stephanopyxis Palmeriana (Grev) Grun. - (7014) (7000, p40)
Coll: Alaska: (7029, p75); Wash: Puget Sound (7017, pl03) (7030); Calif: Trinidad Head-Eel River; north of Cape Mendocino (7014)
Hab: Neritic, temperate (7017, pl03) (7029, p75)

Stephanopyxis turris (Greville and Arnott) Ralfs - (7000,p40)
Dist: Not abundant off southern Calif. and in Gulf of Calif. (7000,p40)
Coll: Alaska: inshore waters (7028); Calif: Trinidad Head-Eel River; north of Cape Mendocino (7014) (7000,p40)
Hab: Neritic. Temperate and subtropical species. Fairly common (7000,p40)

Thalassiosira aestivalis Gran and Angst - (7029,p75) (7000,p47)
Dist: Reported off southern Calif, but distribution in time and abundance not yet known (7000,p47)
Coll: Alaska: (7029,p75); Wash: Puget Sound (7017,pl03) (7030) Calif: Trinidad Head-Eel River; north of Cape Mendocino (7014)
Hab: Neritic (7000,p47), temperate (7017,pl03)

Thalassiosira baltica - (7020)
Dist: Seattle to San Diego (7020)

Thalassiosira bioculata - (7030)
Coll: Wash: Puget Sound (7030)

Thalassiosira condensata Cleve - (7017,pl03)
Coll: Alaska: Scotch Cap Light (7029,p75); Wash: Puget Sound (7017,pl03) (7030)
Hab: Neritic, temperate (7017,pl03) (7029,p75)

Thalassiosira decipiens (Grunow) Jorgensen - (7000,p48)
Dist: North temperate species. Reported in Gulf of Calif. Present but never abundant off southern Calif. (7000,p48)
Coll: Alaska: inshore waters (7028) (7029,p74); Wash: Puget Sound (7030) (7017,pl03); Ore: inshore stations. Columbia River (7010), Coos Bay (7019), Coquille Pt. (7019); S. Calif: (7021), inshore (7026)
Hab: Neritic (7000,p48) (7029,p75)

Thalassiosira gravida Cl. - (7029,p74)
Dist: Alaska to San Diego (7020)
Coll: Alaska: Scotch Cap Light (7029,p74)
Hab: Neritic (7029,p74)

Thalassiosira hyalina - (7023)
Coll: S. Calif: (7023)

Thalassiosira nordenskioldii Cl. - (7029, p74)
Coll: Alaska: inshore waters (7022) (7029, p74); Wash: Puget Sound (7030); S. Calif: inshore (7026), Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic (7029, p74)
Temp: (<2-19°C (7009)

Thalassiosira pacifica Gran - (7017, pl03)
Coll: Alaska: (7029, p75); Wash: Puget Sound (7017, pl03) (7030)
Hab: Neritic, temperate (7017, pl03)

Thalassiosira rotula Meunier - (7000, p49)
Dist: Moderately common off southern Calif. Present in Gulf of Calif. and north of Scotch Cap, Alaska (7000, p49)
Coll: Alaska: inshore waters (7028) (7029, p75); Wash: Puget Sound (7017, pl03) (7030); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic. Temperate and south temperate species (7000, p49) (7029, p75)

Thalassiosira subtilis (Ostf.) Gran - (7029, p74)
Coll: Alaska: (7029, p74); S. Calif: inshore (7026)
Hab: Oceanic (7029, p74)

Family: Eupodiscaceae

Aulacodiscus argus (Ehr.) A. Schm. - (7029, p74)
Coll: Alaska: Scotch Cap Light (7029, p74)
Hab: Neritic (7029, p74)

Family: Actinodiscaceae

Actinoptychus splendens - (7023)
Coll: Wash: Puget Sound (7030); S. Calif: (7023)

Actinoptychus undulatus (Bailey) Ralfs - (7000, p67)
Dist: Very wide (7000, p67)
Coll: Alaska: Scotch Cap (7029, p75); Wash: Puget Sound (7030) (7017, pl03); S. Calif: (7023)
Hab: Neritic. Bottom form; frequently found in the plankton (7000, p67). Tychopelagic (7017, pl03) (7029, p75)

Asteromphalus heptactis (Breb.) Ralfs - (7029,p74)
Dist: Scotch Cap, Alaska to Gulf of California (7000,p69)
Coll: Alaska: Scotch Cap (7029,p74); Wash: Puget Sound (7017,pl02); Ore: off Newport (7031); S. Calif: (7023)
Hab: Temperate, oceanic (7017,pl02) (7029,p74)

Family: Biddulphiaceae

Biddulphia aurita (Lyngbye) Brébisson and Godey
Dist: Widespread, most abundant in northern (arctic and boreal) seas. Very common at Scotch Cap, Alaska, especially during April and May. Common off southern California but never in large numbers (7000,pl62)
Coll: Alaska: (7029,p74); Wash: Puget Sound (7030), Grays Harbor (3635); Ore: inshore stations, Columbia River (7010),off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic and littoral (7000,pl62) (7029,p74)

Biddulphia levis Ehr. - (7017,pl03)
Coll: Puget Sound (7017,pl03)
Hab: Tychopelagic (7017,pl03)

Biddulphia longicruris Greville - (7000,pl54)
Dist: Temperate to subtropical species. Reported north to Straits of Juan de Fuca. Most abundant in warmer waters. Common at Point Hueneme (7000,pl56)
Coll: Alaska: (7029,p74); Wash: Puget Sound (7017,pl03) (7030); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic (7000,pl56); temperate (7017,pl03) (7029,p74)

Biddulphia mobiliensis Bail. - (7029,p75)
Coll: Alaska: Scotch Cap Light (7029,p75); Wash: Puget Sound (7030); Calif: (7000,pl53)
Hab: Neritic (7029,p75)

Biddulphia pulchella Gray - (7029,p75)
Coll: Alaska: Scotch Cap Light (7029,p75)
Hab: Tychopelagic (7029,p75)

PHYTOPLANKTON - CHRYSOPHYTA - Biddulphiaceae

Biddulphia rhombus (Ehrenberg) W. Smith - (7000, pl 63)
Dist: North temperate species. Rare off Calif. (7000, pl 63)
Hab: Neritic (7000, pl 63)

Cerataulina Bergonii Perag. - (7017, pl 03)
Dist: Common off Calif. Gulf of Calif. to Alaska (7000, pl 67)
Coll: Alaska: (7029, p75); Wash: Puget Sound (7030) (7017, pl 03); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014); S. Calif: (7023)
Hab: Neritic, temperate (7017, pl 03) (7029, p75)

Ditylum brightwellii (West) Grunow - (7000, pl 48)
Dist: South temperate species. A common form off southern Calif., in Gulf of Calif., and north to Scotch Cap, Alaska. Never in very large numbers (7000, pl 48)
Coll: Alaska: inshore waters (7028) (7029, p75); Wash: Puget Sound (7030) (7017, pl 03); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic (7000, pl 48) (7029, p75)

Eucampia zoodiacus Ehrenberg - (7000, pl 45) (7017, pl 03)
Dist: South temperate species. Very widely distributed. Often abundant off southern Calif., especially from March through July, and in Gulf of Calif. Common as far north as Scotch Cap, Alaska (7000, pl 46)
Coll: Alaska: inshore waters (7022), Scotch Cap (7029, p75); Wash: Puget Sound (7030) (7017, pl 03); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic (7000, pl 46) (7029, p75)

Hemiaulus hauckii - (7023)
Coll: S. Calif: (7023)

Isthmia nervosa Kütz - (7029, p75)
Dist: Alaska to San Francisco (7000, pl 66)
Coll: Alaska: Scotch Cap Light (7029, p75)
Hab: Tychopelagic (7029, p75)

Streptotheca thamesis Shrubs. - (7029, p74)
Dist: Alaska to southern Calif. (7000, pl 48)
Coll: Alaska: Scotch Cap Light (7029, p74)
Hab: Neritic (7029, p74)

Family: Chaetoceraceae

Chaetoceros affinis Lauder - (7014) (7017,pl03)
Coll: Alaska: (7029,p75); Wash: Puget Sound (7030) (7017,pl03); Ore: Blacklock Pt. region (7019); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic, temperate (7017,pl03) (7029,p75)

Chaetoceros anastomosans - (7030)
Coll: Puget Sound (7030)

Chaetoceros approximatus Gran - (7017,pl03)
Coll: Puget Sound (7017,pl03) (7030)
Hab: Neritic, temperate (7017,pl03)

Chaetoceros atlanticus - (7028) (7030)
Coll: Alaska: inshore waters (7028); Wash: Puget Sound (7030); S. Calif: (7000,pl03)
Hab: Oceanic

Chaetoceros compressus Lauder - (7000,pl19)
Dist: Boreal to south temperate species. Very important species off Calif. and lower Calif. coasts and in Gulf of Calif. Very abundant off southern Calif. from March through June and in some years again in November and December (7000,pl20)
Coll: Alaska: inshore waters (7022); Wash: Puget Sound (7017, pl03) (7030); Ore: Blacklock Pt. region (7019); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014); S. Calif: (7021) (7023)
Hab: Neritic (7000,pl20) (7029,p74); temperate (7017,pl03)

Chaetoceros concavicornis Mangin - (7017,pl03) (7014)
Coll: Wash: Puget Sound (7017,pl03) (7030); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014); S. Calif: (7000,pl10)
Hab: Neritic, temperate (7017,pl03) (7029,p74)

Chaetoceros constrictus Gran - (7000,pl22)
Dist: North temperate species. Abundant at some times off Calif. Common throughout eastern Pacific (7000,pl23)
Coll: Alaska: (7029,p74); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic (7000,pl23) (7029,p74)

Chaetoceros convolutus Castr. - (7029,p74) (7014)
Coll: Alaska: (7029,p74); Wash: Puget Sound (7030); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014); S. Calif: (7000,pl10)
Hab: Oceanic (7029,p74)

Chaetoceros criophilum - (7019)
Coll: Ore: Blacklock Pt. region (7019); S. Calif: (7023)

Chaetoceros crucifer Gran - (7017,pl03)
Coll: Wash: Puget Sound (7017,pl03) (7030)
Hab: Temperate, neritic (7017,pl03)

Chaetoceros curvisetus Cl. - (7019) (7029,p75)
Dist: Alaska to San Diego (7020)
Coll: Alaska: (7029,p75); Ore: Coos Bay region (7019), Coquille Pt. region (7019), Blacklock Pt. region (7019), Port Orford region (7019), off Newport (7031); S. Calif: (7021) (7023)
Hab: Neritic (7029,p75)

Chaetoceros danicum Cl. - (7023) (7029,p74)
Coll: Alaska: (7029,p74); Wash: Puget Sound (7030); S. Calif: (7023) (7000,pl09)
Hab: Neritic (7029,p74)

Chaetoceros debilis Cleve - (7000,pl38)
Dist: Seattle to San Diego (7020); north temperate species. Very common and abundant especially in February, March, and April, and in some years again during October, November, and December. Probably most abundant species off Calif. Also plentiful off Lower Calif. (7000,pl40)
Coll: Alaska: inshore waters (7022) (2028) (7029,p74) (7026); Wash: Puget Sound (7017,pl03) (7030); Ore: Coos Bay region (7019), Coquille Pt. region (7019); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014) (7021) (7023)
Hab: Neritic (7000,pl40), temperate (7017,pl03)
Notes: See also (7026) (7029) (7030)

Chaetoceros decipiens Cl. - (7029,p74) (7014)
Coll: Alaska: inshore waters (7028), Scotch Cap (7029,p74); Wash: Puget Sound (7030); Ore: Coos Bay region, Blacklock Pt. region (7019), off Newport (7031); Calif: Trinidad Head-

Chaetoceros decipiens Cl. - continued
Eel River, north of Cape Mendocino (7014) (7023), inshore southern Calif. (7026)
Hab: Oceanic (7029, p74)

Chaetoceros densum - (7028)
Coll: inshore Alaskan waters (7028)

Chaetoceros diadema Ehr. - (7017, pl 03)
Dist: Fairly common off Calif. (7000, pl 30)
Coll: Puget Sound (7017, pl 03) (7030)
Hab: Neritic, temperate (7017, pl 03)

Chaetoceros didymus Ehr. - (7017, pl 03) (7014)
Coll: Alaska: (7029, p75); Wash: Puget Sound (7017, pl 03) (7030); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014) (7023)
Hab: Neritic, temperate (7017, pl 03) (7029, p75)

Chaetoceros difficilis Cleve - (7000, pl 32)
Dist: Reported off southern Calif. occasionally in fairly large numbers. North temperate species (7000, pl 32)
Hab: Neritic (7000, pl 32)

Chaetoceros Eibenii (Grun.) - (7017, pl 03)
Coll: Wash: Puget Sound (7017, pl 03) (7030); S. Calif: (7000, pl 07)
Hab: Neritic, temperate (7017, pl 03)

Chaetoceros furcillatus Bail. - (7029, p74)
Coll: Alaska: Scotch Cap Light (7029, p74)
Hab: Neritic (7029, p74)

Chaetoceros gracilis - (7030)
Coll: Wash: Puget Sound (7030); S. Calif: (7000, pl 44)

Chaetoceros laciniosus Schütt - (7029, p75) (7017, pl 03)
Coll: Alaska: (7029, p75); Wash: Puget Sound (7017, pl 03) (7030); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic, temperate (7017, pl 03) (7029, p75)

Chaetoceros lorenzianus Grun. - (7017,pl03)
Coll: Alaska: Scotch Cap Light (7029,p75); Wash: Puget Sound (7017,pl03) (7030); Calif: (7000,pl18)
Hab: Neritic, temperate (7017,pl03) (7029,p75)

Chaetoceros pelagicus Cleve - (7000,pl29)
Dist: Warm-water species, south temperate to subtropical. Not common off southern Calif. (7000,pl30)
Hab: Neritic (7000,pl30)

Chaetoceros perpusillus Cleve - (7000,pl37)
Dist: North temperate species. Not common off southern Calif. (7000,pl37)
Hab: Neritic (7000,pl37)

Chaetoceros peruvianus Brightw. - (7029,p74)
Coll: Alaska: Scotch Cap Light (7029,p74); S. Calif: (7023)
Hab: Oceanic (7029,p74)

Chaetoceros pseudocrinitus Ostf. - (7017,pl03)
Coll: Alaska: Scotch Cap Light (7029,p74); Wash: Puget Sound (7017,pl03) (7030)
Hab: Neritic, temperate (7017,pl03) (7029,p74)

Chaetoceros radicans Schütt - (7029,p74)
Coll: Alaska: Scotch Cap Light (7029,p74); Wash: Puget Sound (7017,pl03) (7030); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Temperate, neritic (7017,pl03) (7029,p74)

Chaetoceros scolopendra - (7019)
Dist: Alaska to San Diego (7020)
Coll: Alaska: inshore waters (7022); Ore: Blacklock Pt. region (7019); S. Calif: (7021) (7023)

Chaetoceros secundus Cleve - (7017,pl03)
Coll: Puget Sound (7017,pl03) (7030)
Hab: Neritic, temperate (7017,pl03)

Chaetoceros seiracanthus Gran - (7017,pl03)
Coll: Wash: Puget Sound (7017,pl03) (7030); Calif: (7000,pl31)
Hab: Temperate, neritic (7017,pl03)

Chaetoceros similis Cleve - (7000,pl35)
Dist: North temperate specie. Rare off southern Calif. Found north to Alaska. Never in large numbers (7000,pl36)
Coll: Alaska: (7029,p74); Wash: Puget Sound (7017,pl03) (7030); S. Calif: (7023)
Hab: Neritic (7000,pl36), temperate (7017,pl03) (7029,p74)

Chaetoceros simplex Ostf. - (7029,p75)
Coll: Alaska: Scotch Cap Light (7029,p75)
Hab: Neritic (7029,p75)

Chaetoceros socialis (Lauder) - (7017,pl03)
Dist: Common off southern Calif. (7000,pl43)
Coll: Alaska: inshore waters (7022). Scotch Cap (7029,p74) Wash: Puget Sound (7030) (7017,pl03); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014) (7021)
Hab: Neritic, temperate (7017,pl03) (7029,p74)

Chaetoceros subsecundus (Grunow) Hustedt - (7000,pl30)
Synonym: C. diadema (?)
Dist: Boreal-arctic species. Fairly common off Calif. but seldom abundant. Recorded as a north temperate species (7000,pl30)
Coll: Alaska: (7029,p74); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic (7000,pl30) (7029,p74)

Chaetoceros teres Cleve - (7000,pl18)
Dist: North temperate or boreal species. Not common off southern Calif. Most abundant March through May (7000,pl18)
Coll: Wash: Puget Sound (7017,pl03) (7030); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic (7000,pl18), temperate (7017,pl03)

Chaetoceros tortissimus - (7014)
Coll: Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)

Chaetoceros Vanheurckii Gran - (7017,pl03)
Coll: Puget Sound (7017,pl03) (7030)
Hab: Temperate, neritic (7017,pl03)

Family: Bacteriastaceae

Bacteriastrum delicatulum - (7014)
Coll: Alaska: Scotch Cap Light (7029, p74); Wash: Puget Sound (7030); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Oceanic (7029, p74)

Bacteriastrum hyalinum Lauder - (7000, p96)
Dist: Common and frequently abundant in eastern Pacific especially in April, May, and June (7000, p96)
Coll: Inshore stations, Columbia River (7010)
Habitat: Neritic (7000, p96)

Bacteriastrum varians - (7026)
Coll: S. Calif: inshore (7026)

Family: Corethronaceae

Corethron hystrix Hensen - (7017, p102) (7014)
Dist: Alaska to Gulf of Calif. (7000, p74)
Coll: Alaska: Scotch Cap Light (7029, p74); Wash: Puget Sound (7017, p102) (7030); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Oceanic, temperate (7017, p102) (7029, p74)

Corethron valdiviae Karst. - (7029, p74)
Coll: Alaska: Scotch Cap Light (7029, p74)
Hab: Oceanic (7029, p74)

Family: Rhizosoleniaceae

Rhizosolenia alata Brightwell - (7000, p90)
Dist: Temperate species. Common off Calif. and north to Alaska. Sometimes abundant off southern Calif. and common in Gulf of Calif. (7000, p92)
Coll: Alaska: Scotch Cap Light (7029, p74); Wash: Puget Sound (7030); Ore: off Newport (7031); Calif: Trinidad Head-

Rhizosolenia alata Brightwell - continued
Eel River, north of Cape Mendocino (7014) (7023)
Hab: Oceanic, but often near the coast (7000,p92) (7029,p74)

Rhizosolinia delicatula Cleve - (7017,pl 03) (7014)
Dist: Common off Calif. (7000,p83)
Coll: Alaska: Scotch Cap Light (7029,p74); Wash: Puget Sound (7017,pl 03) (7030); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic, temperate (7017,pl 03) (7029,p75)

Rhizosolenia fragilissima Bergon (7017,pl 03)
Coll: Wash: Puget Sound (7017,pl 03) (7030); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic, temperate (7017,pl 03)

Rhizosolinia obtusa Hensen - (7029)
Coll: Alaska: Scotch Cap Light (7029)
Hab: Oceanic (7029)

Rhizosolenia Hebetata form *semispina* Hensen - (7029)
Coll: Alaska: Scotch Cap Light (7029); Wash: Puget Sound (7030)
Hab: Oceanic (7029)

Rhizosolinia setigera Brightw. - (7017,pl 03)
Coll: Alaska: Scotch Cap Light (7029,p75); Wash: Puget Sound (7017,pl 03) (7030); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic, temperate (7017,pl 03) (7029,p75)
Temp Tolerance: (5-20)°C (7015)

Rhizosolenia Stolterfothii Perag. - (7017,pl 03) (7029,p75)
Dist: Widely, common and often abundant (7000,p83)
Coll: Alaska: Scotch Cap Light (7029,p75); Wash: Puget Sound (7017,pl 03) (7030); Ore: Blacklock Pt. region (7019), off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic, temperate (7017,pl 03) (7029,p75)

Rhizosolinia styliformis Brightw. - (7029,p74)
Coll: Alaska: Scotch Cap Light (7029,p74); Wash: Puget Sound (7030); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014) (7023)
Hab: Oceanic (7029,p74)

Family: Leptocycindraceae

Lauderia annulata - (7030)
Coll: Puget Sound (7030)

Lauderia borealis Gran - (7000, p74)
Dist: Temperate species. Common not abundant off Calif. Reported in Gulf of Calif. and north to Scotch Cap, Alaska (7000, p75)
Coll: Alaska: (7029, p75); S. Calif: (7023)
Hab: Neritic (7000, p75) (7029, p75)

Leptocylindrus danicus Cleve - (7017, pl03)
Coll: Alaska: inshore waters (7022), Scotch Cap Light (7029); Wash: Puget Sound (7030) (7017, pl03); S. Calif: (7021) (7023)
Hab: Temperate, neritic (7017, pl03) (7029, p74)

Leptocylindrus minimus Gran - (7017, pl03)
Coll: Alaska: Scotch Cap Light (7029, p74); Wash: Puget Sound (7017, pl03)
Hab: Neritic, temperate (7017, pl03) (7029, p74)

Family: Fragilariaceae

Asterionella japonica Cleve - (7000, pl88)
Dist: Seattle to San Diego (7020); south temperate species. Widespread. Often in large numbers (7000, pl89)
Coll: Alaska: Scotch Cap Light (7029, p75); Wash: Puget Sound (7030) (7017, pl03); Ore: Coos Bay region, Blacklock Pt. region (7019), off Newport (7031); Calif: (7021)
Hab: Neritic (7000, pl89), temperate (7017, pl03) (7029, p75)
Temp: Optimum (20-25)°C Maximum <30°C (7002)

Asterionella kariana Grun. - (7029, p74)
Dist: Alaska to California (7020)
Coll: Alaska: (7029, p74); Wash: Puget Sound (7030); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic (7029, p74)

Campylosira cymbelliformis - (7014)
Coll: Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Tychopelagic (7000, p180)

Fragilaria islandica Grun. - (7029, p74)
Coll: Alaska: Scotch Cap Light (7029, p74)
Hab: Neritic (7029, p74)

Fragilaria striatula Lyn. - (7029, p75)
Coll: Alaska: Scotch Cap Light (7029, p75)
Hab: Tychopelagic (7029, p75)

Family: Tabellariaceae

Grammatophora angulosa Ehrenberg - (7000, pl74)
Dist: Found occasionally in plankton collections. Temperate species (7000, pl74)
Hab: Littoral (7000, pl74)

Grammatophora marina (Lyngbye) Kützing - (7000, pl74)
Dist: Widespread (7000, pl74)
Coll: Alaska: Scotch Cap Light (7029, p75)
Hab: Littoral, but often present in plankton collections taken near shore (7000, pl74), neritic (7029, p75)

Grammatophora oceanica (Ehrenberg, 1854, in part) Grunow - (7000, pl76)
Dist: Widespread (7000, pl76)
Hab: Littoral. Present occasionally in plankton collections taken near shore (7000, pl76)

Licmophora abbreviatta - (7014)
Coll: Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)

Licmophora lyngbyei (Kütz.) Grun. - (7029, p75)
Coll: Alaska: Scotch Cap Light (7029, p75); Calif: (7023)
Hab: Tychopelagic (7029, p75)

Rhabdonema arcuatum (Lyn. Ag.) Kütz. - (7029, p75)
Coll: Alaska: Scotch Cap Light (7029, p75)
Hab: Tychopelagic (7029, p75)

Striatella unipunctata (Lyn.) Ag. - (7029,p75)
Coll: Alaska: Scotch Cap Light (7029,p75)
Hab: Tychopelagic (also classed as south temperate, neritic) (7029,p75)

Thalassionema nitzschioides Grunow - (7000,p182)
Dist: North temperate species. Very common and often abundant off southern Calif. and Lower Calif., in the Gulf of Calif., and north to Scotch Cap, Alaska (7000,p183)
Coll: Alaska: inshore waters (7028), Scotch Cap Light (7029,p75) Wash: Puget Sound (7017,p107) (7030); Ore: Coos Bay region (7019), inshore stations, Columbia River (7010), off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014), inshore (7026); S. Calif: (7023)
Hab: Neritic (7000,p183) (7029,p75)

Thalassiothrix delicatula - (7031)
Coll: Ore: off Newport (7031)

Thalassiothrix frauenfeldii Grun. - (7029,p74)
Dist: Common Gulf of Calif. to Scotch Cap, Alaska (7000,p185)
Coll: Alaska: Scotch Cap Light (7029,p74); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014) (7023)
Hab: Oceanic (7029,p74)

Thalassiothrix longissima Cl. and Grun - (7029,p74)
Coll: Alaska: inshore waters (7028), Scotch Cap Light (7029,p74); Wash: Puget Sound (7030); Ore: off Newport (7031); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Oceanic (7029,p74)

Family: Naviculaceae

Navicula membranacea Cleve - (7000,p193)
Dist: Temperate species. Found occasionally off southern Calif. and in Gulf of Calif. (7000,p193)
Coll: S. Calif: (7023)
Hab: Neritic. Truly planktonic (7000,p193)

Tropidoneis antarctica - (7014)
Coll: Wash: Puget Sound (7030); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Littoral or neritic (7000, p197)

Family: Bacillarlaceae

Nitzschia closterium (Ehrenberg) W. Smith - (7000, p200)
Dist: Ubiquitous. Very common in the littoral zone, frequently in the plankton (7000, p200)
Coll: Alaska: (7029, p75); Wash: Puget Sound (7030) (7017, p103); Ore: off Newport (7031); Calif: (7023)
Hab: Tychopelagic (7017, p103) (7029, p75), neritic boreal arctic (7029, p75)

Nitzschia delicatissima Cleve - (7017, p103)
Coll: Alaska: Scotch Cap Light (7029, p74); Wash: Puget Sound (7030) (7017, p103); Ore: inshore station, Columbia River plume (7010)

Nitzschia longissima - (7014)
Coll: Alaska: inshore waters (7028); Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)

Nitzschia pacifica (Cupp 1943) - (7000, p204)
Dist: Alaska to southern Calif. (7000, p204)
Coll: Calif: Trinidad Head-Eel River, north of Cape Mendocino (7014)
Hab: Neritic or possibly oceanic temperate species (7000, p204)

Nitzschia paradoxa (Gmelin) - (7017, p103)
Coll: Puget Sound (7017, p103) (7030)
Hab: Neritic, temperate (7017, p103)

Nitzschia pungens Grun. - (7029, p75)
Coll: Alaska: Scotch Cap Light (7029, p75)
Hab: Neritic (7029, p75)

Nitzschia seriata Cl. - (7029)
Coll: Alaska: Scotch Cap Light (7029); Wash: Puget Sound (7030); Ore: Coquille Pt. region, Blacklock Pt. region, Port Orford region (7019), off Newport (7031); Calif: (7021) (7023)

Nitzschia seriata Cl. - continued
inshore (7026)
Hab: Oceanic (7029, p75); classed by some authors as northern neritic (7029)

Family: Silicoflagellaceae

Distephanus speculum
Coll: Ore: Columbia River plume, inshore station (7010), off Newport (7031)

Division: PYRROPHYTA

Ceratium azoricum - (7025)
Dist: Warm water form (7035, p407, pt. 2)
Coll: S. Calif: inshore (7025)

Ceratium candelabrum - (7028)
Dist: All warm seas to 57°N (7036, p273)
Coll: Alaska: inshore waters (7028)

Ceratium furca (Ehr.) Duj. - (7029, p95)
Dist: Widespread in temperate cold water (7035, p369)
Coll: Alaska: inshore waters (7028) (7029, p95); Ore: off Newport (7031); S. Calif: (7021), inshore (7024) (7025)

Ceratium fuscus (Ehr.) Clap. and Lachm. - (7029, p95) (7024)
Coll: Alaska: inshore waters (7028) (7029, p95); Ore: off Newport (7031); S. Calif: inshore (7024) (7025)

Ceratium kofoidii - (7025)
Coll: Alaska: inshore waters (7028); S. Calif: inshore (7025)

Ceratium longpipes (Bail.) Gran - (7029, p95) (7028)
Coll: Alaska: inshore waters (7028), Scotch Cap Light (7029, p95)

Ceratium pentagonum Gourr. - (7029, p95) (7028)
Coll: Alaska: inshore waters (7028), Scotch Cap Light (7029, p95)
Hab: Regarded as warm water species (7036, p277)

PHYTOPLANKTON - PYRROPHYTA

Ceratium tripos (O. F. Müller) Nitzsch - (7029,p95) (7021)
Coll: Alaska: inshore waters (7028) (7029,p95); Ore: off Newport (7031); S. Calif: (7021), inshore (7024) (7025)

Dinophysis acuminanta Clap. and Lach. - (7029,p95) (7025)
Coll: Alaska: (7029,p95); S. Calif: inshore (7025)
Hab: Neritic, euryhaline and eurythermal (7036,p196)

Dinophysis acuta Ehr. - (7029,p95)
Coll: Alaska: Scotch Cap Light (7029,p95)
Hab: Euryhaline and Eurythermal (7036,p198)

Dinophysis arctica Méresch. - (7029,p95)
Coll: Alaska: Scotch Cap Light (7029,p95)

Dinophysis caudata Kent - (7029,p95) (7021)
Dist: Widely distributed in warm to temperate but seldom in cold waters (7036,p201)
Coll: Alaska: inshore waters (7028) (7029,p95); Calif: (7021)

Dinophysis ellipsoides Kof. - (7029,p95)
Coll: Alaska: Scotch Cap Light (7029,p95)

Dinophysis homunculus - (7025)
Coll: S. Calif: inshore (7025)

Dinophysis ovum Schütt - (7029,p95) (7025)
Coll: Alaska: (7029,p95); S. Calif: inshore (7025)

Dinophysis rotundata Clap. and Lachm. - (7029,p95)
Coll: Alaska: Scotch Cap Light (7029,p95)

Gonyaulax sp. - (7029,p95)
Coll: Alaska: Scotch Cap Light (7029,p95)

Noctiluca miliaris - (7021)
Dist: Cosmopolitan, neritic (7036,p221)
Coll: S. Calif: (7021)

Peridinium crassipes Kof. - (7029,p95)
Dist: In all oceans, oceanic to neritic (7036,p248)
Coll: Alaska: Scotch Cap Light (7029,p95)

PHYTOPLANKTON - PYRROPHYTA

Peridinium depressum Bail. - (7029, p95) (7024)
Dist: In all cold and warm waters (7035, p254)
Coll: Alaska: (7029, p95); S. Calif: inshore
Hab: Neritic and oceanic euryhaline (7035, p254)

Peridinium divergens Ehr. - (7029, p95) (7021)
Coll: Alaska: inshore waters (7028) (7029, p95); S. Calif: (7021) (7025)

Peridinium granii - (7024)
Dist: In cold and warm waters of all oceans, also in brackish water (7036, p238)
Coll: S. Calif: inshore (7024)

Peridinium minutum - (7025)
Coll: S. Calif: inshore (7025)

Peridinium ovatum (Pouch.) Schutt - (7029, p95)
Dist: In all oceans including Antarctic (7036, p236)
Coll: Alaska: Scotch Cap Light (7029, p95)
Hab: Oceanic or neritic, euryhaline and eurythermal (7036, p236)

Peridinium pentagonum Gran - (7029, p95)
Dist: Cool and warm water all seas (7035, p241)
Coll: Alaska: Scotch Cap Light (7029, p95)
Hab: Neritic and estuarine (7035, p241) (7036, p253)

Peridinium steinii Jörg. - (7029, p95)
Coll: Alaska: Scotch Cap Light (7029, p95)

Phalacroma rudgei Mur. and Whit. - (7029, p95)
Dist: South Atlantic species (7036, p185)
Coll: Alaska: Scotch Cap Light (7029, p95)

Procentrum micans Ehr. - (7029, p95) (7021)
Dist: Probably worldwide (7036, p179)
Coll: Alaska: inshore waters (7028) (7029, p95); S. Calif: (7021), inshore (7024)
Hab: Oceanic, neritic, and estuarine (7036, p179)

Anisomonas astigmatica Scagel and Stein - (5210,p18)
Dist: Southern British Columbia (5210,p18)
Hab: Free swimming or floating in phytoplankton of inlets (5210,p18)
Str.& Repro.: (5269,p1211-1212)

Blidingia minima (Nägeli) Kylin - (5210,p42)
Str. & Repro.: (5013,p249 as *Enteromorpha minima* and *E. micrococca*); (5021,p221 as *Enteromorpha nana* var. *minima*); (5000,p50 as *Enteromorpha minima* and *E. micrococca*); (5234,p17 as *Enteromorpha minima*)

Blidingia minima (Nägeli) Kylin var. *minima* Kylin - (5210,p42) (5267,p36)
Dist: Dutch Harbor, Alaska, to Mexico and in Chile (5210,p43) (5267,p37)
Hab: On rocks and old wood in the upper intertidal zone, characteristically forming a dense green carpet (5210,p43)
Str.&Repro.: (5013,p249 as *Enteromorpha minima* and *E. micrococca*); (5021,p221 as *Enteromorpha nana* var. *minima*); (5000,p50 as *Enteromorpha minima* and *E. micrococca*); (5234,p17 as *Enteromorpha minima*)

Blidingia minima var. *subsalsa* (Kjellman) Scagel - (5267,p37) (5210,p43) (5234,p17)
Dist: Skagway, Alaska to Oregon (5210,p44) (5267,p37)
Hab: On rocks in the intertidal zone and above the intertidal zone on dripping rocks; common in lagoons and on mud flats (5210,p44)
Tax: (5267,p37)
Str.&Repro.: (5013,p249 as *Enteromorpha minima* and *E. micrococca*); (5021,p221 as *Enteromorpha nana* var. *minima*); (5000,p50 as *Enteromorpha minima* and *E. micrococca*); (5234,p17 as *Enteromorpha minima*)

Brachiomonas submarina Bohlin - (5210,p20)
Dist: Southern British Columbia to Monterey, Calif.(5210,p20)
Hab: In spray pools, near high tide mark (5210,p20)
Ref: (5249,p75) (5003,p322)
Str.&Repro.: (5249,p75) (5003,p322) (5243,p83,93,95)

Bryopsis corticulans Setchell - (5000,p73) (5265,p26) (5267,p62) (5234,p28) (5210,p123)
Dist: British Columbia to southern Calif. (5000,p73)
Coll: Ore: Coos Bay, Cape Arago (5265,p26) (5210,p123) (5267,p62)

Bryopsis corticulans Setchell - continued

Hab: Growing between the 2.0 and -1.5 foot tide levels on vertical sides of rocks. Usually restricted to rocks exposed to strong surf, occasionally epiphytic; rarely present in abundance (5000,p73)

Tax: Phyc. Bor.-Amer. No. 626 (5013,p160) (5156,p231) (5170,p104)

Str. & Repro: (5170,p103)

Bryopsis hypnoides Lamouroux - (5000,p73) (5267,p62)

Dist: British Columbia to Panama (5000,p74) (5267,p62)

Hab: Growing on sand covered rocks between the 2.5 and 0.5 foot tide levels (5000,p74)

Tax: (5013,p159); Phyc. Bor.-Amer. No. 1028

Str. & Repro: (5170,p103)

Bryopsis plumosa (Hudson) C. Agardh, 1822 - (5210,p123) (5267,p63)

Dist: Southern British Columbia to central Calif.(5210,p124) (5267,p63)

Hab: On rocks, shells, and old wood, and epiphytic on other algae in the lower intertidal zone (5210,p124) (5267,p63)

Str. & Repro: (5243,p375) (5170,p103) (5000,p72)

Chaetamorpha aerea (Dillwyn) Kützing - (5000,p56)

Dist: Central to southern Calif. (5000,p56)

Hab: Growing between the 6.0 and 2.0 foot tide levels. Usually in small sandy tide pools but at times on bare or sand-covered rocks. Abundant everywhere. Frequently over 10 cm. in length; usually 4-8 cm. long (5000,p56)

Tax: (5013,p200) (5024,p219) (5029,p67)

Chaetomorpha californica Collins, in Collins, Holden and Setchell, 1900 - (5210,p83)

Dist: Juan de Fuca Strait to southern Calif. (5210,p83)

Hab: In pools in the intertidal zone and in the subtidal zone to a depth of 5 fms; attached to rocks and shells (5210,p83)

Str. & Repro: (5000,p55) (5218,p183)

Chaetomorpha cannabina (Areschoug) Kjellman, 1889 - (5210,p83) (5267,p52)

Dist: Norton Sound, Alaska to northern Washington (5210,p84) (5267,p52)

Hab: In tangled masses, often intertwined with other algae in pools, and on wood in the intertidal zone (5210,p84) (5267,p52)

Str. & Repro: (5000,p55) (5218,p183)

ALGAE - CHLOROPHYTA

Chaetomorpha recurva Scagel - (5210, p84)
  Chaetomorpha tenuissima Jao - (5267, p52)
    Dist: Northern Washington (5210, p84)
    Coll: Turn Island, San Juan Channel (type loc.) (5210, p84)
    Hab: Epiphytic on various other algae, including *Codium fragile*, *Platythamnion pectinatum*, *Acrochaetium rhizoideum*, and articulated coralline algae in the lower intertidal and upper subtidal zones (5210, p84)
    Str. & Repro: (5000, p55) (5218, p183)

Chlamydomonas pulsatilla Wohlenweber - (5210, p21)
    Dist: Southern British Columbia (5210, p21)
    Hab: In rock spray pools (5210, p21)
    Str. & Repro: (5003, p315)

Chlorochytrium inclusum Kjellman - (5000, p67) (5210, p103) (5234, p27) (5267, p59)
    Dist: Alaska to central Calif. (5267, p59) (5210, p104) (5000, p67)
    Hab: Endophytic within cortex of various foliaceous Florideae; especially *Iridophycus*, *Rhodoglossum*, and *Pugetia* (5000, p67). Endophytic in *Schizymenia* and *Iridea* (5267, p59)
    Tax: (5013, p147); Phyc. Bor.-Amer. No. 514
    Str. & Repro: (5028, p379) (5106 as *Chlorocystis*)

Chlorochytrium Porphyrae Setchell and Gardner - (5000, p67) (5267, p59) (5234, p28) (5210, p104)
    Dist: Cape Flattery, Wash. to the Monterey Peninsula (5000, p67) (5210, p104) (5267, p59)
    Hab: Endophytic beneath surface of gelatinous matrix of *Porphyra perforata* and *P. lanceolata* (5000, p67) (5210, p104) (5267, p59)
    Tax: (5013, p150); Phyc. Bor.-Amer. No. 2280
    Str. & Repro: (5028, p379) (5106 as *Chlorocystis*)

Cladophora albida (Hudson) Kützing, 1843 - (5210, p86) (5267, p52)
    Dist: Northern Washington to El Salvador (5210, p87) (5267, p53)
    Hab: In the intertidal zone (5210, p87) (5267, p53)
    Str. & Repro: (5032, p17) (5030, p467) (5214, p32) (5221, p1)

Cladophora Bertolonii var. *hamosa* (Kützing) Ardissone - (5000, p61)
    Dist: Known only from Pacific Grove, Calif. (5000, p61)
    Coll: Balearic Islands (type loc.) (5000, p61)
    Tax: (5032, p344) (5013, p218)
    Str. & Repro: (5030)

ALGAE - CHLOROPHYTA

Cladophora delicatula Montagne - (5000,p61) (5234,p22)
Dist: Monterey Peninsula to San Diego, Calif. (5000,p61)
Hab: At the -0.5 foot tide levels on piling of the Municipal Wharf, Monterey, Calif. (5000,p61)
Tax: (5032,p337) (5013,p220); Phyc. Bor.-Amer. No. 1582
Str. & Repro: (5030)

Cladophora flexuosa Harvey - (5000,p60) (5210,p87) (5267,p53)
Dist: Alaska to southern Calif. (5000,p60) (5210,p88) (5267,p53)
Hab: In quiet water and intermingled with *Enteromorpha* (5000,p60)
Tax: (5032,p339) (5013,p217); Phyc. Bor.-Amer. No. 2239
Str. & Repro: (5030)

Cladophora glaucescens (Griffiths) Harvey, 1862 - (5210,p88) (5267,p53)
Dist: Entrance to Kyuquot Sound, west coast of Vancouver Island, British Columbia to Oakland, Calif. (5210,p89) (5267,p53)
Hab: In pools in the upper intertidal zone (5210,p89) (5267,p53)
Str. & Repro: (5032,p17) (5030,p467) (5214,p32) (5221,p1)

Cladophora gracilis (Griffiths) Kützing, 1845 - (5210,p89) (5234,p23) (5267,p53)
Dist: Sitka, Alaska to northern Washington (5210,p90) (5267,p54)
Hab: In shallow pools in the upper and middle intertidal zones (5210,p90) (5267,p54)
Str. & Repro: (5032,p17) (5030,p467) (5214,p32) (5221,p1)

Cladophora graminea Collins - (5000,p59)
Dist: Central to southern Calif. (5000,p59)
Hab: Growing between the 0.5 and -1.5 foot tide levels. Usually on the receding vertical face of an overhanging rock (5000,p59)
Tax: (5032,p19) (5013,p211); *Cladophora erecta* Collins in Phyc. Bor.-Amer. No. 1690 (name only); (5024,p219) (5029,p67)
Str. & Repro: (5030)

Cladophora hemisphaerica Gardner - (5000,p57) (5234,p23)
Dist: Monterey Peninsula (5000,p58)
Hab: Growing on rocks between the 3.0 foot and mean low tide levels. At times on rocks in tide pools (5000,p58)
Tax: Phyc. Bor.-Amer. No. 2240 (name only); (5031,p83) (5013,p209)
Str. & Repro: (5030)

Cladophora hutchinsiae var. distans (C. Agardh) Kützing - (5267,p54)
Dist: Southern British Columbia (5267,p54)
Hab: In the intertidal zone (5267,p54)
Tax: (5010,p228) (5013,p213) (5012,p346) (5041)

Cladophora hutchinsiae var. hutchinsiae (Dillwyn) Kützing, 1845 - (5210,p90)
Dist: Queen Charlotte Island, British Columbia to northern Washington (5210,p91)
Hab: In the intertidal zone (5210,p91)
Str. & Repro: (5032,p17) (5030,p467) (5214,p32) (5221,p1)

Cladophora laetevirens (Dillwyn) Kützing, 1843 - (5210,p91) (5267,p54)
Dist: Southern British Columbia to northern Washington (5210,p92) (5267,p54)
Hab: In the lower intertidal and upper subtidal zones (5210,p92)
Str. & Repro: (5032,p17) (5030,p467) (5214,p32) (5221,p1)

Cladophora microcladioides Collins - (5000,p59) (5210,p92) (5267,p55) (5234,p23) (5265,p25)
Dist: Southern British Columbia to Mexico (5210,p92) (5267,p55)
Coll: Ore: Coos Bay, Cape Arago (5265,p25)
Hab: Growing on rocks low in the intertidal zone (5000,p59)
Tax: (5032,p17) (5013,p212)
Str. & Repro: (5030)

Cladophora ovoidea Kützing - (5000,p60)
Dist: Santa Cruz to the Monterey Peninsula, Calif. (5000,p60)
Hab: Growing low in the intertidal zone (5000,p60)
Tax: (5032,p346) (5013,p214)
Str. & Repro: (5030)

Cladophora stimpsonii Harvey, 1859 - (5210,p93) (5267,p55)
Dist: Southern British Columbia to southern Calif. (5210,p93) (5267,p55)
Hab: On shells and stones in the intertidal zone (5210,p93) (5267,p55)
Str. & Repro: (5032,p17) (5030,p467) (5214,p32) (5221,p1)

Cladophora trichotoma (C. A. Agardh) Kützing - (5000,p58) (5267,p55) (5234,p23) (5210,p93) (5265,p25)
Dist: British Columbia to Baja Calif. (5000,p58)
Coll: Ore: Coos Bay, Cape Arago (5265,p25) (5267,p56)
Hab: Growing on tops and sides of rocks between the 3.0 and

Cladophora trichotoma (C. A. Agardh) Kützing - continued
mean low tide levels. Abundant everywhere (5000,p58)
Tax: (5012,p349) (5013,p210); Phyc. Bor.-Amer. No. 820; (5024,p219) (5029,p67)
Str. & Repro: (5030)

Codiolum gregarium A. Braun, 1855 - (5210,pl05) (5267,p60)
Dist: Southern British Columbia to northern Washington (5210, pl06) (5267,p60)
Hab: On rocks, shells, logs, and old iron in the intertidal zone (5210,pl06) (5267,p60)
Str. & Repro: (5254,p76) (5255,p249) (5237,pl) (5246,pl)

Codiolum Petrocelidis Kuckuck - (5000,p68) (5210,pl06) (5267,p60)
Dist: Whidbey Island, Washington to Monterey Peninsula (5000,p68) (5210,pl06) (5267,p60)
Hab: Endophytic within Petrocelis franciscana (5000,p68) (5210,pl06)
Tax: (5013,pl52); Phyc. Bor.-Amer. No. 2281

Codiolum pusillum f. subsessile Jao - (5267,p60)
Dist: Northern Washington (5267,p60)
Hab: On old wood in the upper intertidal zone (5267,p60)
Tax: (5259,p99)

Codium fragile (Suringar) Hariot - (5000,p75) (5265,p26) (5267,p64) (5234,p30) (5210,pl18)
Dist: Alaska to Baja Calif. (5000,p76) (5210,pl19) (5267,p64)
Coll: Ore: Coos Bay, Cape Arago (5265,p26)
Hab: Growing on tops and sides of rocks between the 1.5 foot and mean low tide levels (5000,p76)
Tax: (5013,pl71) (5156,p228) (5170,pl11)
Str. & Repro: (5156,p228) (5170,pl11)

Codium ritteri Setchell and Gardner, 1903 - (5210,pl20) (5267,p65)
Dist: Attu Island to Berg Bay, Alaska with certainty and possibly to the west coast of Vancouver Island, British Columbia (5210,pl21) (5267,p65)
Hab: On rocks in lower intertidal and upper subtidal zones (5210,pl21) (5267,p65)
Str. & Repro: (5156,p228) (5000,p74) (5272,p79)

ALGAE - CHLOROPHYTA

Codium Setchellii Gardner - (5000,p75) (5265,p26) (5267,p65) (5234,p30) (5210,p121)
Dist: Sitka, Alaska to Mexico (5210,p121) (5267,p65)
Coll: Ore: Coos Bay, Cape Arago (5265,p26)
Hab: Growing on vertical faces of rocks between 1.0 and -1.5 foot tide levels. Rarely present in abundance (5000,p75)
Tax: (5060,p490) (5013,p168) (5156,p227)
Str. & Repro: (5156,p228) (5170,p111)

Collinsiella tuberculata Setchell and Gardner - (5267,p32) (5000,p31) (5234,p5) (5210,p23)
Dist: Vancouver Island, British Columbia to central Calif. (5267,p51) (5000,p31) (5210,p23)
Hab: Growing between the 2.5 and 1.5 foot tide levels on rocks scoured smooth by sand (5000,p31), on stones in middle intertidal zone (5210,p23)
Tax: (5010,p204) (5012,p141) (5013,p144) (5011,p199) (5041,p101)
Str. & Repro: (5010,p204) (5011,p199 as Ecballocystis willeana)
Ref: (5266,p31) (5268,p969) (5217,p307) (5220,p186)

Derbesia marina (Lyngbye) Solier - (5000,p71) (5210,p113) (5234,p28) (5267,p63)
Dist: Alaska (Sitka) to southern Calif. (5267,p63) (5210,p114) (5000,p72)
Hab: Epiphytic on crustose Corallinaceae growing between the mean low tide and -1.0 foot tide levels. Also dredged from a depth of 30-35 feet (5000,p72) (5267,p63)
Tax: (5032,p407) (5013,p165)
Str. & Repro: (5043) (5170,p114)

Derbesia pacifica Jao - (5267,p63)
Dist: Northern Washington (5267,p63)
Hab: Epiphytic on articulated corallines in the upper subtidal zone (5267,p63)
Tax: (5259,p106)

Derbesia vaucheriaeformis (Harvey) J. Agardh - (5267,p64)
Dist: Yukutat B., Alaska to northern Washington (5267,p64)
Hab: Dredged from the subtidal zone (5267,p64)
Tax: (5010,p230) (5013,p165) (5012,p406) (5259,p107)

Dunaliella salina (Dunal) Teodoresco - (5267,p31) (5000,p28) (5210,p16)
Dist: Northern Washington to Monterey Peninsula, Calif. (5000,p28) (5210,p16) (5267,p31)

Dunaliella salina (Dunal) Teodoresco - continued
Hab: Near high tide in spray filled pools (5210,p16) (5000,p28)
Tax: (5006,p230) (5007,p173)
Str. & Repro: (5004,p353,409) (5005) (5243,p86)
Ref: (5048,p172 as *Haematococcus salinus* and *Protococcus salinus*); (5003,p308) (5096,p238) (5266,p31)

Endophyton ramosum Gardner - (5000,p36) (5234,p7)
Dist: San Francisco to Monterey (5000,p36)
Coll: Oregon (5234)
Hab: Endophytic within *Rhodoglossum americanum* and various species of *Iridophycus* (5000,p36)
Tax: (5019,p372) (5013,p292)
Str. & Repro: (5019,p371)

Enteromorpha Ahlneriana Bliding - (5234,p15)

Enteromorpha angusta (Setchell and Gardner) Hollenberg - (5234,p20)

Enteromorpha clathrata (Roth) Greville - (5000,p51) (5284,p38) (5234,p16)
Dist: Sitka, Alaska to Carmel Bay, Calif. (5000,p52) (5284,p38)
Hab: Epiphytic on other algae of mid-littoral zone (5000,p52)
Tax: (5026,p28) (5013,p260) (5016,p63) (5024,p218)
Str. & Repro: (5025) (5021,p221)

Enteromorpha compressa (Linnaeus) Greville - (5000,p52) (5267,p38) (5234,p14)
Dist: Bering Sea, Alaska to Magdalena Bay, Baja Calif. (5000, p52) (5267,p39)
Hab: Abundant on rocks between 3.5 and 1.5 foot tide levels (5000,p52)
Tax: (5026,p25) (5013,p251) (5024,p218)
Str. & Repro: (5025) (5021,p221)

Enteromorpha crinita (Roth) J. Agardh, 1883 - (5210,p48) (5265,p24)
Dist: Valdez, Alaska to San Diego, Calif. and in the Galapagos Islands (5210,p49)
Hab: Growing on wood and floating in the intertidal zone (5210,p49)
Str. & Repro: (5263,p349) (5022,p40) (5025,p375) (5212,p281) (5213,p92) (5260,p33) (5224,p193)

ALGAE - CHLOROPHYTA

Enteromorpha intestinalis (Linnaeus) Link - (5234,p14) (5000,p49) (5265,p24)
Dist: Kukak Bay, Alaska to La Paz, Baja Calif. (5000,p50)
Coll: Ore: Coos Bay, Cape Arago (5265,p24)
Hab: Saxicolous or epiphytic, growing between 3 feet and the mean low tide levels (5000,p50)
Tax: (5026,p23) (5013,p252)
Str. & Repro: (5025) (5021,p221)
Poll. Studies: (2475,p341)

Enteromorpha intestinalis var. *clavata* J. Agardh, 1883 - (5210,p50) (5267,p39)
Dist: Kukak Bay, Alaska to Mexico (5210,p50) (5267,p39)
Hab: Attached to pebbles in middle intertidal zone (5210,p50)
Str. & Repro: (5263,p349) (5022,p40) (5025,p375) (5212,p281) (5213,p92) (5260,p33) (5224,p193)

Enteromorpha intestinalis var. *cylindracea* J. Agardh, 1883 - (5210,p50) (5267,p39)
Dist: Popof Island, Alaska to Mexico (5210,p51) (5267,p39)
Hab: Usually floating unattached in sheltered waters (5210,p51)
Str. & Repro: (5263,p349) (5022,p40) (5025,p375) (5212,p281) (5213,p92) (5260,p33) (5224,p193)

Enteromorpha intestinalis var. *intestinalis* (Linnaeus) Link, 1820 - (5210,p51) (5267,p39)
Dist: Kukak Bay, Alaska to Mexico and Chile (5210,p52) (5267,p40)
Hab: On rocks or epiphytic on other algae in upper intertidal zone, particularly in somewhat brackish water (5210,p52)
Str. & Repro: (5263,p349) (5022,p40) (5025,p375) (5212,p281) (5213,p92) (5260,p33) (5224,p193)

Enteromorpha intestinalis var. *maxima* J. Agardh, 1883 - (5210,p52) (5267,p40)
Dist: Kukak, Alaska to Mexico (5210,p52) (5267,p40)
Hab: Usually floating unattached in sheltered waters (5210,p52) (5267,p41)
Str. & Repro: (5263,p349) (5022,p40) (5025,p375) (5212,p281) (5213,p92) (5260,p33) (5224,p193)

Enteromorpha linza (Linnaeus) J. Agardh, 1883 - (5210,p52) (5234,p18) (5267,p41)
Dist: Orca, Alaska to Mexico and Chile (5210,p54) (5267,p41)

Enteromorpha linza (Linnaeus) J. Agardh, 1883 - continued
Hab: On rocks or epiphytic on other algae in lower intertidal zone (5210,p54)
Str. & Repro: (5263,p349) (5022,p40) (5025,p375) (5212,p281) (5213,p92) (5260,p33) (5224,p193)

Enteromorpha linza var. crispata J. Agardh - (5234,p19)
Coll: Oregon (5234)

Enteromorpha linza var. flexicaulis Hollenberg - (5234,p19)
Coll: Oregon (5234)

Enteromorpha linza var. lanceolata J. Agardh - (5234,p18)
Coll: Oregon (5234)

Enteromorpha linza var. oblanceolata Hollenberg - (5234,p19)
Coll: Oregon (5234)

Enteromorpha marginata J. Agardh, 1842 - (5210,p54) (5267,p41)
Dist: Southern British Columbia to Calif. (5210,p54) (5267,p41)
Hab: Epiphytic on spermatophytes, usually in salt marshes, but also on other substrata in intertidal zone (5210,p54)
Str. & Repro: (5263,p349) (5022,p40) (5025,p375) (5212,p281) (5213,p92) (5260,p33) (5224,p193)

Enteromorpha micrococca Kützing - (5000,p50) (5265,p24)
Dist: Dutch Harbor, Alaska to Mexico (5000,p50)
Hab: On vertical rock faces between 3. 5 foot and 1. 5 foot tide levels (5000,p50)
Tax: (5026,p20) (5013,p249); Phyc. Bor. -Amer. No. 66
Str. & Repro: (5025) (5021,p221)

Enteromorpha minima Naegeli - (5000,p50) (5265,p24) (5234,p17)
Dist: Alaska to Mexico (5000,p51)
Coll: Coos Bay, Cape Arage (5265,p24)
Hab: Growing in upper portion of the intertidal zone (5000,p51)
Tax: (5026,p24) (5013,p250); Phyc. Bor. -Amer. No. 912
Str. & Repro: (5025) (5021,p221)

Enteromorpha prolifera var. prolifera (Müller) J. Agardh 1883 - (5267,p42) (5210,p54) (5234,p14)
Dist: Golovnin Bay, Alaska, to central Mexico and Peru (5210, p55) (5267,p42)

Enteromorpha prolifera var. prolifera (Müller) J. Agardh 1883 - continued
Hab: On sticks and stones and epiphytic on other algae in the lower intertidal zone in sheltered bays, often floating (5210, p55)
Str. &Repro: (5263, p349) (5022, p40) (5025, p375) (5212, p281) (5213, p92) (5260, p33) (5224, p193)

Enteromorpha prolifera var. flexuosa (Wulf.) Doty - (5234, p15)

Enteromorpha torta (Mertens) Reinbold, 1893 - (5210, p55) (5267, p42)
Dist. Southern British Columbia to San Diego, Calif. (5210, p56) (5267, p42)
Hab: Attached to rocks in shallow pools in the upper intertidal zone; also in lagoons (5210, p56)
Str. &Repro: (5263, p349) (5022, p40) (5025, p375) (5212, p281) (5213, p92) (5260, p33) (5224, p193)

Enteromorpha tubulosa Kützing - (5000, p51) (5210, p56) (5267, p43)
Dist: Northern Washington to Central America (5267, p43)
Hab: Growing on rocks between the 2.5 and 1.0 foot tide levels (5000, p51)
Tax: (5013, p256) (5026, p22); Phyc. Bor. -Amer. No. 471
Str. &Repro: (5025) (5021, p221)

Enteromorpha vexata (Setchell and Gardner) Hollenberg - (5234, p21)
Tax: Ulva vexata (5018, p282) (5013, p271)

Entocladia codicola Setchell and Gardner - (5000, p35)
Dist: Moss Beach (San Mateo, County) and Monterey Peninsula, Calif. (5000, p35)
Hab: Growing within tips of utricles of Codium fragile (5000, p35)
Tax: (5018, p293) (5013, p290)

Entocladia viridis Reinke - (5000, p35) (5210, p30) (5267, p33)
Dist: Southern British Columbia to Monterey, and in Galapagos Archipelago and Chile (5210, p31) (5267, p33)
Hab: Endophytic in Callithamnion Pikeanum, Delesseria decipiens, and other algae in lower intertidal and subtidal zones (5000, p35) (5210, p31)
Tax: (5013, p288) (5016, p53)

Gayella constricta Setchell and Gardner - (5000, p54)
Dist: Friday Harbor, Wash.; Mussel Point and Tomales Point (type loc.), Calif. (5000, p54)

Gayella constricta Setchell and Gardner - continued
Hab: Growing intermingled with Prasiola meridionalis but restricted to the lowermost portion of the Prasiola belt (5000,p54)
Tax: (5028,p384) (5013,p280)
Str. & Repro: (5028,p384)

Gomontia polyrhiza (Lagerheim) Bornet and Flahault - (5267,p61) (5210,p108) (5000,p41) (5234,p7)
Dist: Neah Bay, Wash. to Monterey Peninsula, Calif. (5000,p41) (5210,p109) (5267,p61)
Hab: In empty shells of clams and mussels (5000,p41) (5267,p61) (5210,p109)
Tax: (5013,p302) (5018,p298)
Str. & Repro: (5018,p298) (5000,p40)

Halicystis ovalis (Lyngbye) Areschoug - (5000,p70) (5210,p116) (5267,p61) (5234,p28) (5265,p26)
Dist: Silver Bay, Alaska to Baja Calif., Mexico (5210,p117)
Coll: Ore: Coos Bay, Cape Arago (5265,p26)
Hab: Epiphytic on crustose Corallinaceae, especially Lithophyllum. The host usually growing between the -0.5 and -1.5 foot tide levels and on vertical shaded sides of rocks not exposed to full force of the surf (5000,p70)
Tax: (5013,p155) (5156,p224) (5075,p782) (5010,p232)
Str. & Repro: (5075) (5076) (5156,p224) (5170,p107)

Hormidium rivulara Kützing - (5234,p6)
Tax: (5249,p166)

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Internoretia fryeana Setchell and Gardner - (5210,p32) (5267,p34)
Dist: Northern Washington (5210,p32) (5267,p34)
Hab: Endophytic in Smithora naiadum and Porphyra naiadum (5210,p32) (5267,p34)
Tax: (5018,p295)
Str. & Repro: (5013,p294) (5018,p294) (5267,p34)

Lola lubrica (Setchell and Gardner) A. and G. Hamel, 1929 - (5210,p76) (5234,p26) (5267,p49) (5060,p492 as Rhizoclonium lubricum) (5013,p185 as Rhizoclonium lubricum)
Dist: Northern Washington to Costa Rica (5210,p76) (5267,p49)
Hab: On mud flats in the intertidal zone (5210,p76) (5267,p49)
Str. & Repro: (5060,p492) (5013,p185)

ALGAE - CHLOROPHYTA

Monostroma arcticum Wittrock - (5210,p35)
Dist: Amaknak Island, Alaska to northern Washington (5210,p36)
Hab: On stones, shells and epiphytic on other algae, including *Odonthalia floccosa* and *Cystoseira geminata*, in the middle and lower intertidal zones (5210,p36)
Str. & Repro: (5020,p665) (5263,p242) (5022,p43) (5021,p217)

Monostroma fractum Jao - (5210,p36) (5267,p34)
Dist: Northern Washington (5210,p36) (5267,p36)
Hab: Floating in shallow water on mud flats in the intertidal zone (5267,p34) (5210,p36)
Tax: (5259,p102)
Str. & Repro: (5020,p665) (5263,p242) (5022,p43) (5021,p217)

Monostroma fuscum (Postels and Ruprecht)Wittrock - (5210,p36)
Str. & Repro: (5020,p665) (5263,p242) (5022,p43) (5021,p217)

Monostroma fuscum var. *blyttii* (Areschoug) Collins - (5210,p37) (5267,p34)
Dist: Southern British Columbia to northern Washington (5210, p38) (5267,p34)
Hab: On pebbles and in tide pools in lower intertidal zone (5210,p38)
Str. & Repro: (5020,p665) (5263,p242) (5022,p43) (5021,p217)

Monostroma fuscum var. *fuscum* (Postels and Ruprecht) Wittrock - (5210,p38) (5267,p35)
Dist: Bering Sea and Aleutian Island, Alaska; Finger Bay, Adak Island, to northern Washington (5210,p38) (5267,p35)
Hab: On stones and epiphytic on other algae in the middle intertidal zone or floating in brackish water (5210,p38)
Str. & Repro: (5020,p665) (5263,p242) (5022,p43) (5021,p217)

Monostroma fuscum var. *splendens* ~~(Rupre~~cht) Rosenvinge - (5210,p39) (5267,p35)
Dist: St. Paul Island, Alaska to southern British Columbia (5210,p39) (5267,p35)
Hab: On stones in middle intertidal zone (5210,p39)
Str. & Repro: (5020,p665) (5263,p242) (5022,p43) (5021,p217)

Monostroma oxyspermum (Kützing) Doty - (5234,p12) (5210,p39) (5267,p35)
Dist: Southern British Columbia to southern Calif. (5210,p40) (5267,p36)

Monostroma oxyspermum (Kutzing) Doty - continued
Hab: On stones and shells (or floating) in lower intertidal zones (5210, p40)
Tax: (5234, p12)
Str. & Repro: (5020, p665) (5263, p242) (5022, p43) (5021, p217)

Monostroma zostericola Tilden - (5000, p43) (5210, p40) (5267, p36) (5234, p11)
Dist: Vancouver Island, Puget Sound to Monterey Peninsula (5000, p43) (5210, p41) (5267, p36) (5265, p24)
Coll: Ore: Coos Bay, Cape Arago (5265, p24)
Hab: Epiphytic on leaves of Zostera. Epiphytic on leaves of Phyllospadix (5000, p43) (5210, p41)
Tax: Tilden in Amer. Alg. Exsicc., #388; (5013, p238) (5021, p217)
Str. & Repro: (5020) (5021, p217) (5263, p242) (5022, p43)

Percursaria percursa (C. Agardh) Rosenvinge, 1893 - (5210, p63) (5267, p46)
Dist: Amaknak Island, Alaska to San Francisco, Calif. and in Chile (5210, p64) (5267, p46)
Hab: In brackish pools in upper intertidal zone and in lagoons (5210, p64) (5267, p46)

Phaeophila polymorpha Jao - (5210, p31) (5267, p33)
Dist: Northern Washington (5210, p32) (5267, p34)
Hab: In empty shells in intertidal zone (5210, p32)
Tax: (5259, p100)
Str. & Repro: (5016, p51)

Prasinocladus lubricus Kuckuck - (5000, p32) (5267, p32) (5210, p24)
Dist: Friday Harbor, Wash. to Monterey Peninsula (5000, p32) (5210, p25) (5267, p32)
Hab: Growing on rock cement tanks and aquaria in upper littoral (5000, p32)
Tax: (5003, p366) (5016, p38)
Str. & Repro: (5014, p377 as Euglenopsis) (5015, p227) (5234, p132) (5223, p17)
Ref: (5012, p141 as P. subsalsus) (5266, p32)

Prasiola calophylla (Carmichael) Meneghini - (5267, p46)
Dist: Northern Washington (5267, p46)
Hab: In brackish water in upper intertidal zone (5267, p46)
Tax: (5010, p215) (5145, p277) (5012, p219)

Prasiola linearis Jao - (5267,p47)
Dist: Northern Washington (5267,p47)
Hab: On gravel and spermatophytes in the upper intertidal zone (5267,p47)
Tax: (5259,p105)

Prasiola meridionalis Setchell and Gardner - (5000,p53) (5267,p47) (5234,p22) (5210,p68)
Dist: Adak Island, Alaska to Santa Cruz, Calif. (5210,p69) (5267,p47)
Hab: Restricted to rocks coated with excrement of sea birds. Usually growing in spray zone but at times growing as low as 2.0 foot tide level (5000,p53)
Tax: (5018,p291) (5013,p278)
Str. & Repro: (5018,p287) (5027)

Pseudodictyon geniculatum Gardner - (5000,p37) (5234,p7)
Dist: Pacific Grove; San Francisco (type loc.) (5000,p37)
Coll: Oregon (5234)
Hab: In cortex of *Dictyoneurum californicum* (5000,p37)
Tax: (5019,p374) (5013,p293)
Str. & Repro: (5019,p374)

Pseudulvella consociata Setchell and Gardner - (5234,p7)
Coll: Oregon (5234)
Tax: (5018,p296) (5013,p297)

Rhizoclonium implexum (Dillwyn) Kützing - (5000,p62) (5267,p47) (5234,p26) (5210,p73)
Dist: St. Michael Island, Alaska to Mexico, and in the Galapagos Islands (5210,p74) (5267,p48)
Hab: Entangled with algae growing between 3.0 and 0.5 foot tide levels (5000,p62)
Tax: (5013,p183); Phyc. Bor.-Amer. No. 976
Str. & Repro: (5030)

Rhizoclonium kerneri Stockmayer - (5267,p48)
Dist: Southern British Columbia to Mexico (5267,p48)
Hab: In loose masses in pools in intertidal zone (5267,p48)
Tax: (5012,p329) (5041,p103) (5013,p185)

ALGAE - CHLOROPHYTA

Rhizoclonium riparium (Roth) Harvey - (5000,p63) (5210,p74) (5267,p48) (5234,p25) (5265,p26)
Dist: Uyak Bay, Alaska to central Calif. (5000,p63) (5265,p26) also the Galapagos Islands and Chile (5210,p75) (5267,p48)
Hab: Near high tide level (5000,p63)
Tax: (5013,p182); Phyc. Bor.-Amer. No. 2238
Str. & Repro: (5030)

Rhizoclonium tortuosum (Dillwyn) Kützing - (5000,p62) (5267,p49) (5234,p25) (5265,p26)
Dist: Alaska to central Calif. (5000,p62) (5267,p49)
Coll: Ore: Coos Bay, Cape Arago (5265,p26)
Tax: (5013,p185)
Str. & Repro: (5030)

Rosenvingiella constricta (Setchell and Gardner) Silva, 1957 - (5210,p69) (5267,p47)
Dist: West coast of Vancouver Island, British Columbia, to Santa Cruz, Calif. (5210,p70) (5267,p47)
Hab: In spray region just above the intertidal zone on exposed rocks (5210,p70) (5267,p47)
Str. & Repro: (5028,p384 as Gayella) (5013,p279 as Gayella) (5000,p54 as Gayella) (5215,p217) (5216,p177)

Schizogonium murale var. uniseriatum Jao, 1937 - (5210,p65) (5267,p46)
Dist: Southern British Columbia to northern Wash. (5210,p66) (5267,p46)
Hab: On old wood in the upper intertidal zone (5210,p66) (5267,p46)
Str. & Repro: (5234,p218) (5259,p104)

Spongomorpha arcta (Dillwyn) Kützing, 1849 - (5210,p96) (5267,p56) (5265,p25)
Dist: Bering Sea to Oregon and in Chile (5210,p97) (5267,p56)
Hab: On rocks and epiphytic on other algae in middle and lower intertidal zones (5210,p97) (5267,p56)
Str. & Repro: (5000,p64) (5237,p1) (5214,p31) (5246,p1)

Spongomorpha coalita (Ruprecht) Collins - (5210,p97) (5000,p65) (5267,p57) (5234,p24) (5265,p25)
Dist: Alaska to central Calif. (5000,p65)
Coll: Ore: (5265,p25) (5210,p98) (5267,p57)
Hab: Growing on rounded boulders between the 1.0 and -1.5 foot tide levels. Also dredged from a depth of 20-25 feet (5000,p65)
Tax: (5032,p361) (5013,p230) (5024,p219) (5029,p67); Phyc. Bor.-Amer. Nos. 819,922

ALGAE - CHLOROPHYTA

Spongomorpha durivscula (Ruprecht) Collins - (5234,p24)
Coll: Oregon (5234)
Tax: (5012,p356) (5013,p225)

Spongomorpha mertensii (Ruprecht) Setchell and Gardner, 1920 - (5267,p57) (5210,p98) (5265,p25) (5234,p24)
Dist: Unalaska Island, Alaska to San Francisco, Calif. (5210,p99) (5267,p57)
Hab: In the middle and lower intertidal zones (5210,p99) (5267,p57)
Str. & Repro: (5000,p64) (5237,p1) (5214,p31) (5246,p1)

Spongomorpha saxatilis var. *chamissonis* and var. *saxatilis* (Ruprecht) Collins, 1909 - (5210,p99) (5265,p295) (5234,p24) (5267,p58)
Dist: Unalaska, Alaska to San Francisco (5210,p100) (5267,p58)
Hab: On rocks and epiphytic on other algae in intertidal zone (particularly in lower intertidal zone) (5210,p100) (5267,p58)
Str. & Repro: (5000,p64) (5237,p1) (5214,p31) (5246,p1)

Spongomorpha spinescens Kützing, 1849 - (5210,p100) (5267,p59) (5265,p25) (5234,p25)
Dist: Unalaska Island, Alaska to Oregon and in Chile (5210,p101) (5267,p58)
Hab: On rocks and epiphytic on other algae in middle and lower intertidal zones (5210,p101) (5267,p59)
Tax: (5013,p229)
Str. & Repro: (5000,p64) (5237,p1) (5214,p31) (5246,p1)

Stephanoptera gracilis (Artari) G. M. Smith - (5000,p27) (5267,p31) (5210,p15)
Dist: Northern Washington to Monterey, Calif. (5210,p15) (5267,p31) (5000,p27)
Hab: Near high tide mark in spray pools on rocks coated with the excrement of sea birds (5000,p28) (5210,p15)
Tax: (5003,p308) (5001,p455)

Tetraselmis maculata Butcher - (5210,p19)
Dist: Southern British Columbia to northern Wash. (5210,p19)
Hab: In spray pools near high tide mark (5210,p19)
Str. & Repro: (5243,p83 as *Platymonas*) (5000,p29 as *Platymonas*) (5269,p1212)

ALGAE - CHLOROPHYTA

Thalassomonas exurgens Butcher - (5210,p17)
Dist: Southern British Columbia (5210,p17)
Hab: Free swimming or floating in phytoplankton of inlets (5210,p17)
Str. & Repro: (5269,p122)
Ref: (5269,p122)

Trentepohlia odorata (Wiggers) Wittrock - (5265,p26)
Dist: Oregon
Coll: Coos Bay, Fossil Pt., Bassendorf Beach, Lighthouse Beach, Lighthouse Reef, Squaw Island
Hab: Growing largely as felted layers on trees, or sometimes on rocks, at considerable distance from tide levels. The semiaquatic variety *umbrina* of Hariot while reported along our coast has not been found (5265,p26)

Ulothrix flacca (Dillwyn) Thuret - (5234,p5) (5267,p32) (5210,p27) (5265,p19)
Dist: St. Michael, Alaska to Calif. (5267,p32) (5210,p28)
Coll: Ore: Coos Bay, Cape Arago (5265,p19)
Hab: On other algae, rocks, and wood in the intertidal zone (frequently in upper region) (5210,p28)
Tax: (5276)
Str. & Repro: (5249,p145)

Ulothrix implexa Kützing - (5000,p34) (5210,p28) (5234,p5) (5267,p33)
Dist: Alaska (St. Michael) to central Calif. (Monterey) (5000,p34) (5210,p29) (5267,p33)
Hab: Growing at water line on fishing boats (5000,p34) rocks and wood at mouths of streams (5210,p29)
Tax: (5017,p153) (5013,p283)
Str. & Repro: (5249,p145)

Ulothrix laetevirens (Hooker) or (Kützing) Collins - (5267,p33) (5210,p29)
Dist: Unalaska Island, Alaska to Calif. (5210,p29)
Hab: On old wood in intertidal zone (5210,p29)
Tax: (5012,p186)
Str. & Repro: (5249,p145)

Ulothrix pseudoflacca Wille - (5265,p19) (5234,p6)
Dist: Coos Bay, Cape Arago, Oregon (5265,p19)
Hab: On rocks that are more or less well worn and essentially bare (5265,p19)
Str. & Repro: (5013,p285)

ALGAE - CHLOROPHYTA

Ulothrix zonata (Web. and Mohr) Kützing - (5234,p6)
Dist: Oregon (5234)
Str. & Repro: (5012,p184)

Ulva augusta Setchell and Gardner - (5000,p45)
Dist: Humboldt County, Calif. to Carmel Bay, Calif. (5000,p45)
Hab: Epiphytic on Egregia laevigata (5000,p45)
Tax: (5018,p283) (5013,p264)
Str. & Repro: (5023) (5022,p36)

Ulva californica Wille - (5234,p11)
Coll: Oregon (5234)
Tax: (5013,p264)

Ulva expansa (Setchell) Setchell and Gardner - (5267,p43) (5234,p10) (5000,p46) (5265,p24) (5210,p58)
Dist: Washington to La Paz, Baja Calif. (5000,p46) (5267,p43)
Coll: Ore: Coos Bay, Cape Arago (5265,p24)
Hab: Free-floating in quiet water. Epiphytic on Gastroclonium Coulteri dredged from a depth of 15-20' (5000,p46)
Tax: (5018,p284) (5013,p268 Ulva fasciata forma expansa Setchell in Phyc. Bor. -Amer. No. 77

Ulva fenestrata Postels and Ruprecht, 1840 - (5267,p43) (5234,p9) (5210,p59) (5265,p24)
Dist: Sitka, Alaska to Oregon (5210,p59) (5267,p43)
Hab: On rocks and free-floating in lower intertidal and upper subtidal zones (5210,p59)
Str. & Repro: (5013, p260) (5020, p665) (5238, p407) (5263, p351) (5022,p36) (5212,p285) (5273,p80) (5261,p40) (5264,p375) (5274,p182) (5044,p403)

Ulva lactuca Linnaeus - (5000,p45) (5265,p19) (5210,p60) (5267,p44)
Dist: St. Michael, Alaska to Gulf of Calif. , Mexico (5000,p45) (5267,p44)
Coll: Ore: Coos Bay, Cape Arago (5265,p19)
Hab: Epiphytic or saxicolous. Growing between 2' mean low tide levels (5000,p45)
Poll. Studies: (2475,p341)
Tax: (5024,p218) (5013,p265)
Str. & Repro: (5023) (5022,p36)

ALGAE - CHLOROPHYTA

Ulva latissima Linnaeus - (5267,p44)
Dist: Juneau, Alaska to northern Washington (5267,p44)
Hab: On mud flats in lower intertidal zone in quiet bays, often floating (5267,p45)
Tax: (5010,p210 as U. lactuca var. latissima)

Ulva Linza Linnaeus - (5000,p44) (5265,p24)
Dist: Orca, Alaska to Baja Calif. (5000,p44)
Coll: Ore: Coos Bay, Cape Arago (5265,p24)
Hab: Growing on rocks between 2' mean low-tide levels. At times epiphytic (5000,p44)
Tax: (5024,p218) (5013,p262)
Str. & Repro: (5023) (5022,p36)

Ulva lobata (Kützing) Setchell and Gardner - (5000,p46) (5234,p10)
Dist: San Francisco to San Diego, Calif. (5000,p47)
Coll: Oregon (5234)
Hab: Usually saxicolous, occasionally epiphytic. Most thalli growing between 2 and 0.5 feet tide levels. Abundant everywhere.
Tax: (5018,p284) (5013,p268);Ulva fasciata forma lobata Setchell in Phyc. Bor.-Amer. No. 863
Str. & Repro: (5023) (5022,p36)

Ulva rigida C. A. Agardh - (5000,p47) (5210,p61)
Dist: Uyak Bay, Alaska to La Paz, Baja, Calif. (5000,p47) (5267,p45)
Hab: Growing on rocks between 4 foot and 2 foot tide levels (5000,p47)
Tax: (5013,p269)
Str. & Repro: (5023) (5022,p36)

Ulva stenophylla Setchell and Gardner - (5000,p47) (5234,p10)
Dist: Bolinas to Monterey (type loc.) (5000,p47)
Coll: Oregon (5234)
Tax: (5018,p282) (5013,p271)
Str. & Repro: (5023) (5022,p36)

Ulva taeniata (Setchell) Setchell and Gardner - (5234,p8) (5000,p48) (5265,p24)
Dist: Coos Bay, Oregon to Carmel Bay, Calif. (5000,p48)
Coll: Ore: Coos Bay, Cape Arago (5265,p24)
Hab: Growing on rocks between 1 and 1 1/2 feet tide levels (5000,p48)

Ulva taeniata (Setchell) Setchell and Gardner - continued
Tax: (5018, p286) (5013, p273 as Ulva fasciata forma taeniata Setchell in Phyc. Bor. -Amer. No. 862) (5024, p218)
Str. &Repro: (5023) (5022, p36)

Ulva vexata Setchell and Gardner, 1920 - (5210, p62)
Dist: Northern Washington to San Francisco, Calif. (5210, p63)
Hab: On rocks high in intertidal zone on exposed coast (5210, p63)
Str. &Repro: (5044, p403) (5013, p260) (5020, p665) (5238, p407) (5263, p351) (5022, p36) (5212, p285) (5273, p80) (5261, p40) (5264, p375) (5274, p182)

Urospora dolifera (Setchell and Gardner) Hollenberg - (5234, p26)

Urospora grandis Kylin - (5234, p26) (5267, p50)
Dist: Unalaska I., Alaska to Oregon (5267, p50)
Hab: On rocks in upper intertidal zone (5267, p50)
Tax: (5060, p494 as Hormiscia frandis) (5013, p195 as Hormiscia grandis)

Urospora mirabilis Areschoug, 1866 - (5210, p78)
Dist: Bering Sea to southern Calif. (5210, p80)
Hab: On rocks and old wood in upper intertidal zone, frequently exposed to surf (5210, p80)
Str. &Repro: (5248, p355) (5237, p1) (5246, p1)

Urospora penicilliformis (Roth) Areschoug - (5000, p64) (5267, p50) (5234, p27) (5265, p25)
Dist: Port Clarence, Alaska to Carmel Bay, Calif. (5000, p64)
Coll: Ore: Coos Bay, Cape Arago (5265, p25) (5267, p50)
Hab: Forming a dark green hair-like coating on rounded boulders between 3.0 and 1.5 foot tide levels (5000, p64)
Tax: (5013, p191); Setchell and Dobie in Phyc. Bor. -Amer. No. 1125
Str. &Repro: (5169)

Urospora sphaerulifera Setchell and Gardner - (5060, p493) (5267, p51)
Dist: Northern Washington (5267, p51)
Hab: On boulders in lower intertidal zone (5267, p51)
Tax: (5060, p493 as Hormiscia sphaerulifera) (5013, p196 as Hormiscia sphaerulifera)

ALGAE - CHLOROPHYTA

Urospora tetraciliata Frye and Zeller - (5267,p51)
Dist: Northern Washington (5267,p51)
Hab: On stones, shells and epiphytic on other algae in intertidal zone (5267,p51)
Tax: (5031,p86 as Hormiscia tetraciliata) (5013,p193 as Hormiscia tetraciliata)

Urospora vancouveriana (Tilden) Setchell and Gardner, in Gardner, 1919 - (5210,p80) (5267,p51)
Dist: Southern British Columbia to northern Washington (5210, p81) (5267,p51)
Hab: On stones and shells in lower intertidal zone (5210,p81)
Str.&Repro: (5248,p355) (5237,pl) (5246,pl)

Urospora wormskjoldii (Mertens) Rosenvinge, 1893 - (5210,p81) (5265, p25) (5267,p51)
Dist: Unalaska, Island, Alaska to southern Calif. (5210, p82) (5267,p52)
Hab: On rocks, shells, and old wood, and epiphytic on other algae in intertidal and upper subtidal zones (5210,p82)
Str.&Repro: (5248,p355) (5237,pl) (5246,pl)

Vaucheria Thuretii Woronin - (5234,p29)
Coll: Oregon (5234,p29)
Tax: (5016,p100)

ALGAE - PHAEOPHYTA

Agarum cribrosum Bory - (5267,p101)
Dist: Bering Sea to northern Washington (5267,p102)
Hab: On rocks in upper subtidal zone down to a depth to at least 5 fms (5267,p102)
Tax: (5010,p265 as A. turneri) (5152,p615)

Agarum fimbriatum Harvey - (5267,p102)
Dist: Southern British Columbia to southern Calif. (5267,p102)
Hab: On rocks from upper subtidal zone down to a depth of several fms (5267,p102)
Tax: (5010,p266) (5152,p616) (5041,p109)

ALGAE - PHAEOPHYTA

Alaria marginata Postels and Ruprecht-(5000,p147) (5267,p108)(5234,p43) (5265,p32)
Dist: Oregon to Central Calif.
Coll: Ore: Coos Bay, Cape Arago (5267,p108) (5265,p32)
Hab: Abundant between mean low-tide and -1.5 ft. to 5-10 feet below extreme low-tide level (5000,p147)
Tax: (5029,p67) (5134,p98) (5152,p640)
Str. &Repro: (5085,p224)

Alaria nana Schrader - (5000,p146) (5267,p108)
Dist: British Columbia to central Calif. (5000,p147) (5267,p109)
Tax: (5127,162) (5152,p636)
Str. &Repro: (5085,p224)

Alaria tenuifolia f. *amplior* Setchell and Gardner - (5267,p109)
Dist: Southern British Columbia to northern Washington (5267,p109)
Hab: On rocks and wood in upper subtidal zone (5267,p109)
Tax: (5010,p274) (5152,p639) (5041,p111)

Alaria tenuifolia f. *tenuifolia* Setchell, in Collins, Holden and Setchell - (5267,p109)
Dist: Bering Sea to northern Washington (5267,p110)
Hab: On rocks in lower intertidal and upper subtidal zones (5267,p110)
Tax: (5297,p45 as *A. tenuifolia*) (5010,p272 as *A. tenuifolia* and as *A. pylaii*) (5152,p638 as *A. tenuifolia*) (5134,p12 as *A. tenuifolia*) (5168,p97 as *A. pylaii*)

Alaria valida Kjellman and Setchell - (5265,p31)
Dist: Oregon, Coos Bay to Cape Arago (5265,p31)
Coll: Coos Head, Lighthouse Reef, Squaw Island, Sunset Bay, North Bay, and South Bay
Hab: In some areas this algae is the major component of the intertidal kelp beds. This is a southward extension of the recorded range of *Alaria valida* (5265,p31)
Tax: (5010,p278)

Alaria valida f. *longipes* Setchell and Gardner - (5267,p110)
Dist: Queen Charlotte Sound, British Columbia to northern Washington (5267,p110)
Hab: On rocks in upper subtidal zone (5267,p110)
Tax: (5010,p279) (5152,p644)

ALGAE - PHAEOPHYTA

Alaria valida f. valida Kjellman and Setchell in Setchell and Gardner - (5297,p278) (5267,p110)
Dist: Unga Island, Alaska to northern Washington (5267,p110)
Hab: On rocks in upper subtidal zone (5267,p111)
Tax: (5010,p278 as A. valida) (5152,p643 as A. valida) (5041, p110 as A. grandifolia)

Chorda filum (Linnaeus) Lamouroux - (5267,p93)
Dist: Bering Sea to northern Washington (5267,p93)
Hab: On stones in upper subtidal zone (5267,p93)
Tax: (5296,p213) (5010,p254) (5152,p592) (5041,p108)

Chordaria dissessa Setchell and Gardner - (5267,p79)
Dist: Northern Washington (5267,p79)
Hab: Epiphytic on Zostera (5267,p79)
Tax: (5010,p249 as Castagnea divaricata) (5150,p8) (5152,p574)

Coilodesme bulligera Strömfelt - (5267,p91) (5265,p28) (5234,p38)
Dist: Alaska to Oregon (5267,p91)
Coll: Ore: Coos Bay to Cape Arago (5265,p28)
Hab: Not common, growing on rocks at low tide level. Setchell and Gardner (5152,p58) report this species as "growing on rocks in lower littoral belt, Shumagon Islands, Alaska, to Coos Bay, Oregon."
Tax: (5152,p581)

Coilodesme californica (Ruprecht)Kjellman - (5000,p131) (5267,p91) (5234,p39) (5265,p28)
Dist: Puget Sound to southern Calif. (5000,p132)
Coll: Ore: Coos Bay to Cape Arago (5265,p28) (5267,p92)
Hab: Epiphytic on Cystoseira osmundaceae. Sporophytes appearing in May and completely disappearing by the end of August. Abundant wherever the host is found (5000,p132)
Tax: (5123,p160) (5152,p579); Phyc. Bor. -Amer. No. 1
Str. & Repro: (5123,p159)

Colpomenia sinuosa f. sinuosa (Roth) Derbes and Solier - (5267,p90) (5000,p128) (5234,p36) (5265,p29)
Dist: Alaska to southern Calif. (5000,p128)
Coll: Ore: Coos Bay to Cape Arago (5265,p29) (5267,p90)
Hab: Usually epiphytic on Gastroclonium Coulteri but also epiphytic on various other algae growing between the

Colopomenia sinuosa f. *sinuosa* (Roth) Derbes and Solier - continued
0.5 and -1.0 foot tide levels. Also dredged (5000,pl28) Frequently is associated with *Leathesia difformis* in lower portion of the *Ulva* association (5265,p29) (5000,pl28)
Tax: (5123,pl64) (5152,p539); Phyc. Bor.-Amer. No. 278
Str. & Repro: (5093) (5123,pl63)

Colpomenia sinuosa f. *tuberculata* (Saunders) Setchell and Gardner - (5267,p90)
Dist: Unalaska Island, Alaska to Mexico (5267,p91)
Hab: On rocks and epiphytic on other algae in the middle intertidal zone (5267,p91)
Tax: (5010,p242) (5151,p725) (5152,p541)

Compsonema secundum Setchell and Gardner - (5000,pl09) (5265,p28)
Dist: Washington to central Calif. (5000,pl09) (5265,p28)
Coll: Wash: Moclips (5000,pl09)
Hab: On pneumatocysts of *Nereocystis Luetkeana*.
Tax: (5146,p361) (5152,p483)
Str. & Repro: (5146)

Compsonema sessile Setchell and Gardner - (5267,p76)
Dist: Northern Washington (5267,p76)
Hab: Epiphytic on *Hedophyllum sessile* (5267,p76)
Tax: (5146,p358) (5152,p474)

Compsonema sporangiiferum Setchell and Gardner - (5267,p77)
Dist: Northern Washington (5267,p77)
Hab: Epiphytic on pneumatocysts of *Nereocystis* (5267,p77)
Tax: (5146,p357) (5152,p481)

Costaria costata (Turner) Saunders - (5000,pl38) (5267,pl00) (5234,p41) (5265,p30)
Dist: Alaska to southern Calif. (5000,pl38)
Coll: Ore: Coos Bay, Cape Arago (5265,p30) (5267,pl00)
Hab: Growing between the 1.0 and -1.5 foot tide levels on rocks exposed to action of surf (5000,pl38)
Tax: (5122,p57) (5152,p610)
Str. & Repro: (5036) (5085,p237)

Costaria Mertensii J. Agardh - (5234,p41) (5267,pl01)
Dist: Bering Sea to Monterey, Calif. (5267,pl01)
Hab: On rocks in upper subtidal zone (5267,pl01
Tax: (5152) (5000,pl38)

ALGAE - PHAEOPHYTA

Cymathere triplicata (Postels and Ruprecht) J. Agardh - (5267,p99)
Dist: Bering Sea to northern Washington (5267,p99)
Hab: On rocks in upper subtidal zone (5267,p100)
Tax: (5126,p430) (5296,p213) (5010,p264) (5152,p608) (5041,p109)

Cystoseira geminata C. Agardh - (5267,p122)
Dist: Bering Sea to northern Washington (5267,p123)
Hab: On rocks in lower intertidal and upper subtidal zones (5267,p123)
Tax: (5061,p285) and (5152,p706) as Cystophyllum geminatum) (5041,p111)

Cystoseira osmundacea (Menzies) C. A. Agardh - (5000,p156) (5234,p45) (5265,p33)
Dist: Northern Oregon to Baja California
Coll: Ore: Seaside (5000,p157) (5265,p33)
Hab: Growing on rocks between mean low-tide and -1.5 foot tide levels. Also dredged from a depth of 20-35 feet near Mussel Point and near Point Aulon (5000,p157)
Tax: (5175,p333) (5152,p709); Phyc. Bor.-Amer. Nos. 46, 45A
Str. & Repro: (5174,p131)

Desmarestia farcta Setchell and Gardner - (5267,p80)
Dist: Northern Washington (5267,p81)
Hab: Probably subtidal (5267,p81)
Tax: (5150,p7) (5152,p562)

Desmarestia foliacea Pease - (5267,p81)
Dist: Northern Washington (5267,p81)
Hab: On rocks in upper subtidal zone (5267,p81)
Tax: (5291,p388 as D. tabacoides) (5292) (5152,p569)

Desmarestia herbacea (Turner) Lamouroux - (5000,p121) (5267,p81) (5234,p35) (5265,p30)
Dist: Alaska to southern California
Coll: Ore: Coos Bay and Cape Arago (5265,p30) (5267,p81) From stomach of a specimen of Aspocatis bison caught in Coos Bay in 1938 (5265,p30)
Hab: Growing on rocks between 0.5 and -1.5 foot tide levels. Also dredged from a depth of 30-35 feet a quarter-mile from the Municipal Wharf, Monterey (5000,p121)
Tax: (5152,p566)
Str. & Repro: (5170,p252)

ALGAE - PHAEOPHYTA

Desmarestia *intermedia* Postels and Ruprecht - (5265,p29)(5267,p82) (5234,p35)
Dist: Bering Sea to Oregon (5267,p82)
Coll: Wash: Puget Sound (5265,p29; Ore: Sunset Bay (5265,p29)
Tax: (5152,p564)

Desmarestia *latifrons* (Ruprecht) Kützing - (5000,pl20) (5234,p35) (5265,p29)
Dist: Oregon to central Calif. (5000,pl21)
Coll: Ore: Coos Bay, Cape Arago (5265,p29)
Hab: Growing on rocks exposed to strong surf and between mean low-tide and -1.5 foot tide levels.
Tax: (5024,p219) (5152,p563); Phyc. Bor.-Amer. No. 279
Str. & Repro: (5170,p252)

Desmarestia *latissima* Setchell and Gardner - (5292,p319) (5267,p83)
Dist: Northern Washington (5267,p83)
Hab: On rocks in quiet bays in upper subtidal zone (5267,p83)
Tax: (5292,p319) (5152,p568)

Desmarestia *ligulata* (Lightfoot) Lamouroux - (5267,p83)
Dist: Southern British Columbia to northern Washington (5267,p83)
Hab: On rocks and shells in lower intertidal and upper subtidal zones (5267,p83)
Tax: (5010,p247) (5152,p566) (5291,p388) (5292,p314)

Desmarestia *media* var. *tenuis* Setchell and Gardner - (5267,p83)
Dist: Juneau, Alaska to northern Washington (5267,p84)
Hab: On stones in upper subtidal zone (5267,p84)
Tax: (5010,p246 as *D.* *aculeata* f. *media*) (5150,p7) (5152,p561) (5041,pl07 as *D.* *aculeata* f. *media*)

Desmarestia *munda* Setchell and Gardner - (5000,pl21) (5267,p84) (5234,p35) (5265,p30)
Dist: Puget Sound to southern California
Coll: Ore: Coos Bay, Cape Arago (5265,p30) (5267,p84)
Hab: Growing on rocks between the mean low-tide and -1.5 foot levels. Also dredged from a depth of 30-35 feet a quarter-mile from Municipal Wharf, Monterey (5000,pl22)
Tax: (5150,p7) (5152,p56)
Str. & Repro: (5170,p252)

ALGAE - PHAEOPHYTA

Desmarestia viridis (Müller) Lamouroux - (5000,p119) (5267,p85)
Dist: Alaska to Carmel, Calif. (5267,p85) (5000,p120)
Tax: (5016,p160); Phyc. Bor.-Amer. No. 531
Str. & Repro: (5170,p252)

Dictyoneurum californicum Ruprecht - (5000,p139) (5267,p104)
Dist: British Columbia to central California (5000,p140)(5267,p104)
Hab: Growing between the 0.5 and -1.5 tide levels on rocks more or less directly exposed to surf. Fairly common on all rocky points of the Peninsula. Also dredged from depth of 15-20 feet (5000,p139)
Tax: (5024,p220) (5128,p47) (5152,p622); Phyc. Bor. -Amer. No. 11
Str. & Repro: (5152,p621)

Dictyosiphon foeniculaceus (Hudson) Greville - (5267,p92)
Dist: Bering Sea to northern Washington (5267,p92)
Hab: On stones and other algae in middle and lower intertidal zones (5267,p92)
Tax: (5126,p422) (5010,p248 in part) (5152,p589) (5041,p107)

Dictyosiphon sinicola Gardner - (5267,p92)
Dist: Southern British Columbia to northern Wash. (5267,p92)
Hab: On rocks on muddy bottom in quiet water (5267,p92)
Tax: (5290,p268)

Dictyota flabellata (Collins) Setchell and Gardner - (5000,p101) (5234,p34)
Dist: Central to southern Calif. (5000,p102)
Hab: Fifteen feet below pneumatocyst of Nereocystis and free floating (5000,p102)
Tax: (5150,p12) (5152,p652)
Str. & Repro: (5162)

Ectocarpus acutus var. acutus Setchell and Gardner - (5000,p80) (5267,p67) (5234,p31) (5265,p27)
Dist: Puget Sound to central Calif. (5000,p81)
Coll: Ore: Coos Bay, Cape Arago (5265,p27)
Hab: Epiphytic on Desmarestia, especially D. herbacea (5000,p81). On kelps and Zostera (5234,p31)
Tax: (5149,p404) (5152,p415)
Str. & Repro: (5092)(5116)

ALGAE - PHAEOPHYTA

Ectocarpus acutus var. haplogloiae Doty - (5234,p32) (5267,p67)
Dist: Northern Washington to Oregon (5267,p68)
Hab: Epiphytic on Haplogloia andersonii in lower intertidal zone (5267,p68)
Tax: (5149,p404)

Ectocarpus confervoides (Roth) Le Jolis - (5267,p68) (5265,p27) (5234,p31)
Dist: Alaska to San Francisco, Calif. (5267,p68)
Coll: Ore: Coos Bay, Cape Arago (5265,p27)

Ectocarpus confervoides var. pygmaecus (Areschoug) Kjellman - (5000,p84); E. pygmaeus Areschoug, in Kjellman (5267,p71)
Dist: Alaska to central Calif. (5000,p84)(5267,p71)
Hab: Growing on Laminariales and Desmarestiales of the lower littoral (5000,p84)
Tax: (5123,p154) (5152,p415)
Str. & Repro: (5092) (5116)

Ectocarpus corticulans Saunders - (5000,p81) (5267,p68)
Dist: Alaska to southern Calif. (5000,p81) (5267,p68)
Hab: Growing on Desmarestia (5000,p81)
Tax: (5123,p152) (5152,p418)
Str. & Repro: (5092) (5116)

Ectocarpus cylindricus Saunders - (5000,p87) (5267,p69)
Dist: Northern Washington to Carmel, Calif. (5267,p69)
Hab: Growing on various Laminariales and on Cystoseira. Most frequently found on pneumatocysts of Egregia menziesii. Also on Calliarthron dredged from a depth of 15-20 feet at Stillwater Cove (5000,p87)
Tax: (5123,p150) (5152,p432); Phyc. Bor.-Amer. No. 1695
Str. & Repro: (5092) (5116)

Ectocarpus granulosus (J. E. Smith) C. A. Agardh - (5000,p81) (5267,p69) (5265,p27) (5234,p31)
Dist: Puget Sound to southern Calif. (5000,p82) (5265,p27) (5267,p70)
Coll: Ore: Coos Bay, Cape Arago (5265,p27) (5267,p70)
Hab: Growing between the 0.5 and -1.5 foot tide levels; on rocks and epiphytic on various larger algae. Also dredged from depths between 15-35 feet (5000,p82)
Tax: (5024,p219) (5123,p156) (5152,p426); Phyc. Bor.-Amer. No. 1589
Str. & Repro: (5092) (5116)

ALGAE - PHAEOPHYTA

Ectocarpus mucronatus Saunders - (5267,p70)
Dist: Southern British Columbia to Mexico (5267,p70)
Hab: Epiphytic on other algae and *Zostera* (5267,p70)
Tax: (5123,p152) (5010,p238) (5152,p419) (5041,p106) (5228,p220)

Ectocarpus oviger Harvey - (5000,p82) (5267,p70) (5265,p27)
Dist: Puget Sound to central Calif. (5000,p83)
Coll: Ore: Coos Bay, Cape Arago (5265,p27) (5267,p70)
Hab: Growing on *Nereocystis Luetkeana* (5000,p83) (5265,p27)
Tax: (5072,p167) (5152,p428)
Str. &Repro: (5092) (5116)

Ectocarpus siliculosus (Dillwyn) Lyngbye - (5265,p27) (5234,p31) (5265,p27)
Dist: Coos Bay, Oregon to San Francisco, Calif. (5265,p27)
Tax: (5152,p410)
Remarks: Very abundant floating in Coos Bay in 1940 (5265,p27)

Ectocarpus terminalis Kützing - (5234,p32) (5267,p71)
Dist: Unalaska I., Alaska, to Laguna, Calif. (5267,p71)
Hab: Epiphytic on larger brown algae (5267,p71)
Tax: (5152,p421)

Ectocarpus tomentosus (Hudson) Lyngbye - (5000,p83) (5267,p71)
Dist: Alaska (Kodiak Island) to southern Calif. (Laguna Beach) (5000,p83) (5267,p71)
Hab: Growing on *Fucus*, *Hesperophycus*, and *Pelvetia* (5000,p83) (5267,p71)
Tax: (5123,p155) (5152,p417); Phyc. Bor.-Amer. No. 478
Str. &Repro: (5092) (5116)

Ectocarpus variabilis (Saunders) G. M. Smith - (5000,p85) (5234,p31)
Ectocarpus dimorphus Silva (5267,p69)
Dist: Puget Sound to Mexico (5000,p85) (5267,p69)
Hab: Growing on various Laminariales, especially *Laminaria Andersonii* and *Lessoniopsis littoralis* (5000,p85)
Tax: (5157,p647) (5289,p42)
Str. &Repro: (5092) (5116)

Egregia Menziesii (Turner) Areschoug subsp. *menziesii* - (5267,p111) (5000,p149) (5234,p44) (5265,p32)
Dist: British Columbia to central Calif. (5000,p150) (5267,p111)
Coll: Ore: Coos Bay, Cape Arago (5265,p32)

Egregia Menziesii (Turner) Areschoug subsp. *menziesii* - continued
Hab: Growing on rocks between the 2.0 foot and mean low-tide levels (5000,p149) (5265,p32)
Tax: (5024,p221) (5029,p67) (5152,p648); Phyc. Bor.-Amer. Nos. 1741, 42
Str. &Repro: (5109) (5119)

Elachistea fucicola (Velley) Areschoug - (5265,p27) (5267,p77) (5234,p33)
Dist: Sitka, Alaska to central Oregon (5265,p27) (5267,p77)
Hab: This species is reported by Setchell and Gardner (5152,p503) as "growing on different species of *Fucus* in the lower littoral belt."
Tax: (5152,p503)

Eudesme virescens (Carmichael) J. Agardh - (5267,p78)
Dist: Shumagin Is., Alaska to southern Calif. (5267,p78)
Hab: On rocks and epiphytic on *Zostera* (5267,p78)
Tax: (5010,p249) (5150,p11 as *Aegira virescens*) (5152,p547 as *Aegira virescens*)

Fucus edentatus f. *acutus* Gardner - (5267,p112)
Dist: Southern British Columbia to northern Wash. (5267,p112)
Hab: On rocks in middle intertidal zone (5267,p112)
Tax: (5010,p280 as *F. inflatus* f. *linearis*) (5152,p680) (5041,p111) (5061,p31)

Fucus edentatus f. *costatus* Gardner - (5267,p112)
Dist: Northern Washington (5267,p112)
Hab: On rocks in lower intertidal zone (5267,p112)
Tax: (5010,p284 as *F. evanescens* f. *angustus*) (5152,p680) (5061,p30)

Fucus edentatus f. *divaricatus* Gardner - (5267,p112)
Dist: Southern British Columbia to northern Washington (5267,p113)
Hab: On sandstone ledges in lower intertidal zone (5267,p113)
Tax: (5010,p281 as *F. inflatus* f. *filiformis*) (5152,p681) (5041,p111 as *F. inflatus* f. *filiformis*) (5061,p31) (5298,p100)

Fucus edentatus f. *divergens* Gardner - (5267,p113)
Dist: Northern Washington (5267,p113)
Hab: On rock ledges in lower intertidal zone (5267,p113)
Tax: (5061,p29) (5152,p679)

ALGAE - PHAEOPHYTA

Fucus edentatus f. edentatus De La Pylaie - (5267, p113)
Dist: Sitka, Alaska to Oregon (5267, p113)
Hab: On rocks in upper and middle intertidal zones (5267, p113)
Tax: (5061, p28 as F. edentatus) (5152, p678 as F. edentatus)

Fucus edentatus var. herperius Gardner - (5234, p45)
Coll: Oregon (5234)
Tax: (5061, p28) (5152, p678)

Fucus evanescens C. Agardh - (5234, p44)
Coll: Oregon (5234)
Tax: (5061, p36) (5152, p681)

Fucus evanescens f. cuneatus Gardner - (5265, p33)
Dist: Near Empire, Coos Bay, Oregon (5265, p33)
Hab: Gardner says (5061, p39): "Growing on sandstone in upper littoral region."

Fucus evanescens f. ecostatus Gardner - (5265, p33)
Dist: Coos Bay, Oregon (5152, p69)
Hab: "Growing on sandstone, wooden floats, etc., in upper littoral belt," (5152, p697)

Fucus evanescens f. evanescens - (5267, p114)
Dist: Bering Sea to Oregon (5267, p114)
Hab: On rocks in intertidal and upper subtidal zones (5267, p114)
Tax: (5041, p111 as F. evanescens) (5061, p36 as F. evanescens) (5152, p681 as F. evanescens)

Fucus evanescens f. flabellatus Gardner - (5267, p114)
Dist: Northern Washington (5267, p114)
Hab: On rocks and ledges in middle intertidal zone (5267, p114)
Tax: (5061, p44) (5152, p689)

Fucus evanescens f. macrocephalus Kjellman - (5267, p114)
Dist: Bering Sea to northern Washington (5267, p115)
Hab: On rocks in middle intertidal zone (5267, p115)
Tax: (5126, p432) (5010, p282) (5152, p684) (5041, p111) (5061, p45) (5298, p100)

Fucus evanescens f. magnificus Gardner - (5267, p115)
Dist: Juneau, Alaska to northern Washington (5267, p115)
Hab: On rocks in upper and middle intertidal zones (5267, p115)
Tax: (5061, p48) (5152, p686)

ALGAE - PHAEOPHYTA

Fucus evanescens f. *nanus* Kjellman - (5267,p115)
Dist: Yakutat Bay, Alaska to Tokeland, central Washington (5267,p115)
Hab: On rocks on mud flats in brackish water in upper intertidal zone (5267,p115)
Tax: (5010,p285) (5152,p698) (5061,p37)

Fucus evanescens f. *oregonensis* Gardner - (5265,p33)
Dist: Coos Bay, Oregon (5265,p33)
Hab: Gardner records it as follows: "Growing on floats, piles, stones, etc. in middle and upper littoral belts." (5061,p40)

Fucus evanescens f. *pergrandis* Kjellman - (5267,p116)
Dist: Unalaska I., Alaska to northern Washington (5267,p116)
Hab: On rocks in upper and middle intertidal zones (5267,p116)
Tax: (5010,p284) (5152,p685) (5041,p111) (5061,p46)

Fucus evanescens f. *robustus* Setchell and Gardner - (5267,p116)
Dist: Bering Sea to northern Washington (5267,p116)
Hab: On rocks in upper intertidal zone in sheltered areas (5267,p116)
Tax: (5010,p283) (5152,p687) (5061,p47) (5298,p100)

Fucus evanescens f. *stellatus* Gardner - (5267,p116)
Dist: Northern Washington (5267,p116)
Hab: On rocks and logs in lower intertidal zone (5267,p116)
Tax: (5061,p49) (5152,p687)

Fucus gardneri f. *abbreviatus* (Gardner) Scagel - (5267,p116)
Fucus furcatus f. *abbreviatus* Gardner - (5265,p32)
Dist: Northern Washington to Oregon (5267,p117)
Hab: On floating objects at North Bend in Coos Bay (5265,p32)
Tax: (5061,p19) and (5152,p672) as *F. furcatus* f. *abbreviatus*

Fucus gardneri f. *angustus* (Gardner) Scagel - (5267,p117)
Fucus furcatus f. *angustus* Gardner - (5265,p32)
Dist: Northern Washington to central Oregon (5267,p117)
Coll: Ore: Sunset Beach, near mouth of Coos Bay, May 1914 (5152,p673)
Tax: (5061,p18) and (5152,p673) as *F. furcatus* f. *angustus*

Fucus gardneri f. contortus (Gardner) Scagel - (5267,p117)
Dist: Northern Washington (5267,p117)
Hab: On rocks in lower intertidal zone (5267,p117)
Tax: (5061,p25) and(5152,p688) as F. furcatus f. contortus

Fucus gardneri f. cornutus (Gardner) Scagel - (5267,p117)
Dist: Yakutat Bay, Alaska to northern Washington (5267,p117)
Hab: On rocks in middle and lower intertidal zones (5267,p118)
Tax: (5041,p111 as F. evanescens f. cornutus) (5010,p283 as F. evanescens f. cornutus) (5152,p671) and (5061,p20) as F. furcatus f. cornutus

Fucus gardneri f. elongatus (Gardner) Scagel - (5267,p118)
Fucus furcatus f. elongatus Gardner - (5265,p32)
Dist: Southern British Columbia to central Oregon (5267,p118)
Coll: Wash: south end of San Juan Island (5265,p32); Ore: Sunset Beach, May 1914 (5061,p21) (5152,p667)
Tax: (5061,p21) and (5152,p667) as F. furcatus f. elongatus

Fucus gardneri f. gardneri Silva - (5267,p118)
Fucus furcatus C. A. Agardh - (5000,p152) (5234,p44)
Fucus furcatus f. typicus - (5265,p32)
Dist: Alaska to central Calif. (5000,p152)
Tax: (5061,p16) (5152,p664)
Str. & Repro: (5055)

Fucus gardneri f. latifrons (Gardner) Scagel - (5267,p119)
Dist: Northern Washington (5267,p119)
Hab: On rocks in middle and lower intertidal zones (5267,p119)
Tax: (5061,p25) and(5152,p670) as F. furcatus f. latifrons

Fucus gardneri f. linearis (Gardner) Scagel - (5267,p119)
Dist: Northern Washington (5267,p119)
Hab: On rocks in lower intertidal zone (5267,p119)
Tax: (5061,p19) and (5152,p672) as F. furcatus f. linearis

Fucus gardneri f. nigricans (Gardner) Scagel - (5267,p119)
Dist: Northern Washington (5267,p119)
Hab: On rocks in middle and lower intertidal zone (5267,p119)
Tax: (5061,p21) and (5152,p671) as F. furcatus f. nigricans

Fucus gardneri f. *reflexus* (Gardner) Scagel - (5267,p120)
Dist: Northern Washington (5267,p120)
Hab: On rocks in lower intertidal zone (5267,p120)
Tax: (5061,p23) and (5152,p669) as *F. furcatus* f. *reflexus*

Fucus gardneri f. *rigidus* (Gardner) Scagel - (5267,p120)
Dist: Southern British Columbia to northern Wash. (5267,p120)
Hab: On rocks in lower intertidal zone (5267,p120)
Tax: (5061,p24) (5152,p668) and (5298,p100) as *F. furcatus* f. *rigidus*

Fucus gardneri f. *variabilis* (Gardner) Scagel - (5267,p120)
Dist: Sitka, Alaska, to southern British Columbia (5267,p120)
Hab: On rocks in middle intertidal zone (5267,p120)
Tax: (5061,p26) and (5152,p669) and (5298,p100) as *F. furcatus* f. *variabilis*

Fucus membranaceus f. *limitatus* Gardner - (5267,p121)
Dist: Southern British Columbia to northern Wash. (5267,p121)
Hab: On rocks and wood in upper intertidal zone (5267,p121)
Tax: (5061,p35) (5152,p675) (5298,p100)

Fucus membranaceus f. *membranaceus* Gardner - (5267,p121)
Dist: Bering Sea to northern Washington (5267,p121)
Hab: On rocks in intertidal zone (5267,p121)
Tax: (5061,p32) and (5152,p673) as *F. membranaceus*

Haplogloia Andersonii (Farlow) Levring - (5000,p117) (5267,p78) (5234,p34) (5265,p28)
Dist: Alaska to southern Calif. (5000,p118)
Coll: Ore: Coos Bay, Cape Arago (5265,p28) (5267,p78)
Hab: Growing between the 0.5 and -1.5 foot tide levels on rocks in tide pools. Usually appearing late in winter and disappearing early in June (5000,p118)
Str.&Repro: (5152,p556 as *Myriogloia*)

Haplogloia kuckuckii Kylin - (5267,p79)
Dist: Sitka, Alaska to northern Washington (5267,p79)
Hab: On rocks in lower intertidal zone (5267,p79)
Tax: (5126,p424 as *Liebmannia*)

ALGAE - PHAEOPHYTA

Hedophyllum sessile (Agardh) Setchell - (5265, p30) (5267, p102) (5234, p42)
Dist: Yakutat Bay, Alaska to Point Sur, Calif. (5267, p103)
Coll: Ore: Coos Bay, Cape Arago; Calif: Bassendorf Beach, Mussel Reef, Sunset Bay, North Bay, South Bay (5265, p30)
Hab: Found on littoral rocks. These plants are frequently conspicuous in the Fucus zone (5265, p30)
Tax: Phyc. Bor. -Amer. Fasc. A, No. 8; (5152, p617)

Hedophyllum subsessile (Areschoug) Setchell - (5265, p31) (5267, p103) (5234, p42)
Dist: Bering Sea to Oregon (5267, p103)
Hab: "Growing on rocks in exposed localities in middle littoral belt." Setchell and Gardner (5150, p619)
Tax: (5130); Phyc. Bor. -Amer., Fasc. B, No. 27
Remarks: A form approaching this species has been obtained from North and Sunset Bay. If it is this plant, it is entirely out of the reported range (5265, p31)

Heterochordaria abietina (Ruprecht) Setchell and Gardner - (5000, p98) (5267, p80) (5234, p33) (5265, p29)
Dist: Alaska to central Calif. (5000, p98)
Coll: Ore: Coos Bay, Cape Arago (5265, p29) (5287, p80) (5000, p98)
Hab: Growing between the 4.0 and 2.5 foot tide levels on rocks exposed to moderate or heavy surf. The erect shoots appearing early in March and disappearing early in November (5000, p98) (5267, p80)
Tax: (5150, p6) (5152, p550)
Str. &Repro: (5152, p550)

Laminaria complanata (Setchell and Gardner) Setchell - (5267, p93)
Dist: Northern Washington (5267, p93)
Hab: On rocks and piles in lower intertidal and upper subtidal zones (5267, p93)
Tax: (5010, p262 as L. saccharina f. complanata); (5152, p596) (5041, p109 as L. saccharina f. complanata)

Laminaria cuneifolia f. amplissima Setchell and Gardner - (5267, p93)
Dist: Sitka, Alaska to northern Washington (5267, p93)
Hab: On rocks and wood in upper subtidal zone in sheltered areas (5267, p94)
Tax: (5010, p258 as L. bullata f. amplissima); (5152, p603); (5041, p109 as L. bullata f. amplissima)

ALGAE - PHAEOPHYTA

Laminaria cuneifolia f. *angusta* Setchell and Gardner - (5267,p94)
Dist: Southern British Columbia to northern Wash. (5267,p94)
Hab: On rocks in upper subtidal zone (5267,p94)
Tax: (5010,p257 as *L. bullata* f. *angusta*) (5152,p602)
(5041,p108 as *L. bullata* f. *angusta*)

Laminaria cuneifolia f. *cuneifolia* J. Agardh - (5265,p30) (5267,p94)
(5234,p39)
Dist: Bering Sea to Oregon (5267,p94) (5265,p30)
Hab: The sublittoral belt (5265,p30)
Tax: (5126,p429) (5152,p600)

Laminaria cuneifolia f. *subsimplex* Setchell and Gardner - (5267,p95)
Dist: Southern British Columbia to northern Washington (5267,p95)
Hab: On rocks in upper subtidal zone (5267,p95)
Tax: (5010,p257 as *L. bullata* f. *subsimplex*) (5152,p602)
(5041,p108 as *L. bullata* f. *subsimplex*)

Laminaria ephemera Setchell - (5000,p136) (5234,p40) (5267,p95)
Dist: Puget Sound to Monterey Peninsula (5000,p137) (5267,p95)
Hab: On rocks in tide pools of lower littoral (5000,p136)
Tax: (5130,p242) (5086,p87) (5134,p92) (5152,p603)
Str.&Repro: (5085,p242) (5086,p87) (5108,p114)

Laminaria platymeris De La Pylaie - (5267,p95)
Dist: Bering Sea to northern Washington (5267,p96)
Hab: In subtidal zone (5267,p96)
Tax: (5041,p109 as *L. bullata* f. *cuneata*) (5152,p605)

Laminaria saccharina f. *linearis* J. Agardh - (5267,p96)
Dist: Unga I., Alaska to northern Washington (5267,p96)
Hab: On rocks in upper subtidal zone (5267,p96)
Tax: (5010,p261) (5152,p596)

Laminaria saccharina f. *membranacea* J. Agardh - (5267,p96)
Dist: Alaska to Oregon (5267,p96)
Hab: On rocks and wood in upper subtidal zone (5267,p96)
Tax: (5010,p261) (5152,p596) (5041,p109)

Laminaria saccharina f. *saccharina* (Linne) Lamouroux - (5267,p97)
(5265,p30) (5234,p39)
Dist: Alaska to Oregon (5267,p97)
Coll: Ore: Old Jetty, Charleston dock, Coos Head, Sunset
Bay, South Bay, Coos Bay (5265,p30)
Tax: (5152,p595)

ALGAE - PHAEOPHYTA

Laminaria setchellii Silva - (5267,p97) (5265,p30) (5234,p40)
Laminaria Andersonii Eaton - (5000,p137)
Dist: Washington to central Calif. (5000,p137)
Coll: Ore: Coos Bay, Cape Arago (5265,p30) (5267,p98)
Hab: Abundant between the 0.5 and -1.5 foot tide levels on all rock points of the Peninsula (5000,p137)
Tax: (5051,p715, name only) (5172,p98) (5024,p220) (5029,p67) (5132,p145) (5152,p605); Phyc. Bor.-Amer. No. 2
Str. &Repro: (5085,p242) (5086,p87) (5108,p114)

Laminaria Sinclairii (Harvey) Farlow - (5000,p135) (5267,p98) (5234,p40) (5265,p30)
Dist: British Columbia to central Calif. (5000,p136)
Coll: Ore: Coos Bay, Cape Arago (5265,p30) (5267,p98) (5265,p30)
Hab: Growing on rocks between mean low tide and -1.0 foot levels (5000,p135)
Tax: (5123,p220) (5128,p45) (5132,p140) (5152,p598); Phyc. Bor.-Amer. No. 7.
Str. &Repro: (5085,p242) (5086,p87) (5108,p114)

Leathesia difformis (Linnaeus) Areschoug - (5000,p114) (5267,p77) (5234,p34) (5265,p27)
Dist: Alaska to southern Calif. (5000,p115)
Coll: Ore: Coos Bay, Cape Arago (5265,p27) (5267,p77)
Hab: Growing on rocks between 2.5 and mean low tide level. Frequently epiphytic on other algae. Abundant everywhere locally (5000,p115)
Tax: (5152,p511); Phyc. Bor.-Amer. No. 829
Str. &Repro: (5170,p249)

Leathesia nana Setchell and Gardner - (5000,p115) (5234,p35)
Dist: Calif. (5000,p115)
Coll: Oregon (5234)
Hab: Epiphytic on upper portion of leaves of Phyllospadix (5000,p115)
Tax: (5150,p3) (5152,p511)
Str. &Repro: (5170,p249)

Lessoniopsis littoralis (Farlow and Setchell) Reinke - (5267,p107) (5234,p43) (5265,p31) (5000,p145)
Dist: Alaska to central Calif. (5000,p145)
Coll: (5265,p31) (5267,p107)

Lessoniopsis littoralis (Farlow and Setchell) Reinke - continued
Hab: Growing between the mean low tide and -1.5 foot tide levels on rocky ledges exposed to full force of the surf (5000,p145); Growing below or in association with Postelsia (5265,p31)
Tax: (5152,p632)
Str. & Repro: (5071 as Lessonia) (5101 as Lessonia)

Macrocystis integrifolia Bory - (5000,p143) (5267,p106) (5265,p31) (5234,p42)
Dist: British Columbia to central Calif. (5000,p144)
Coll: Ore: Coos Bay, Cape Arago (5265,p31) (5267,p106)
Hab: Growing in tidal channels and on gently sloping rocky ledges on rocks between 0.5 and -0.5 foot tide levels (5000,p144)
Tax: (5152,p628) (5143,p447) (5157,p647)
Str. & Repro: (5074) (5097) (5143)
Poll. Studies: (5300,p14,18,29,55,90,114)

See also Chapter 20
p. 266

Macrocystis pyrifera (Linnaeus) C. A. Agardh - (5000,p144) (5234,p42) (5265,p31)
Dist: Alaska to Baja California (5000,p144) (5265,p31)
Hab: Growing in extensive stands on rocks 20-25 feet below surface of water. Upper ends of branches growing to surface of water (5000,p114). Abundant in sublittoral kelp beds (5265,p31)
Tax: (5024,p220) (5029,p67) (5152,p627) (5157,p647); Phyc. Bor.-Amer. No. 39
Str. & Repro: (5074) (5097) (5143)
Poll. Studies: (5300,p14,18,29,55,90,114)

See also Chapter 20
p. 266

Myelophycus intestinale Saunders - (5267,p87)
Dist: Shumagin Is., Alaska to northern Wash. (5267,p88)
Hab: On rocks in lower intertidal and upper subtidal zones (5267,p88)
Tax: (5126,p420) (5010,p241) (5152,p527)

Myelophycus intestinalis f. Tenue Setchell and Gardner - (5265,p29)
Dist: (5150,p528) "Coos Bay, Oregon to central California."
Coll: Oregon (5265,p29)
Tax: (5028,p385)

Myrionema compsonematoides Setchell and Gardner - (5267,p75)
Dist: Northern Washington (5267,p75)
Hab: Epiphytic on *Laminaria complanata*
Tax: (5145,p343) (5152,p467)

Myrionema foecundum f. *ramulosum* Setchell and Gardner - (5267,p75)
Dist: Northern Washington (5267,p75)
Hab: Epiphytic on pneumatocyst of *Nereocystis* (5267,p75)
Tax: (5145,p337) (5152,p462)

Myrionema foecundum f. *simplicissimum* Setchell and Gardner - (5267,p75)
Dist: Kodiak I., Alaska to central Calif. (5267,p75)
Hab: Epiphytic on sporophylls of *Nereocystis* and other brown algae (5267,p75)
Tax: (5010,p249 as *M. strangulans*) (5145,p336) (5152,p461)

Myrionema globosum f. *affine* Setchell and Gardner - (5267,p75)
Dist: Sitka, Alaska to Point Carmel, Calif. (5267,p75)
Hab: Epiphytic on *Zostera* (5267,p75)
Tax: (5145,p342) (5152,p471)

Myrionema primarium Setchell and Gardner - (5000,p105) (5267,p76) (5234,p34) (5265,p28)
Dist: Alaska to central Calif. (5000,p105) (5267,p76)
Coll: Ore: Coos Bay (type loc.), Cape Arago (5000,p105) (5267,p76) (5265,p28)
Hab: Epiphytic upon various algae but most frequently encountered on Laminariales. Found on old thalli of Laminariales practically everywhere on the Monterey Peninsula (5000,p105)
Tax: (5145,p334) (5152,p456)

Myrionema strangulans Greville - (5000,p106) (5267,p76)
Dist: Alaska to central Calif. (5000,p107) (5267,p76)
Hab: Abundant on *Ulva lobata* at Pebble Beach during summer months. Also found on *U. taeniata* at the Middle Reef of Moss Beach (5000,p107)
Tax: (5152,p471)

ALGAE - PHAEOPHYTA

Nereocystis Luetkeana (Mertens) Postels and Ruprecht - (5234,p42)
(5000,p141) (5267,p104) (5265,p31)
Dist: Alaska to southern Calif. (5000,p141)
Coll: Ore: Coos Bay, Cape Arago (5265,p31) (5267,p105)
Hab: Growing in extensive beds on rocks 30-50 feet below surface of water. Upper end of stipe growing to and floating horizontally on surface of water (5000,p141). Mature dwarf plants are often found in larger tide pools (5265,p31)
Tax: (5050,p354) (5051,p707) (5024,p220) (5029,p67) (5129,p179) (5135,p126) (5152,p624); Phyc. Bor. -Amer. No. 10
Str. & Repro: (5173) (5100) (5128,p183)

Pelvetia fastigiata (J. G. Agardh) De Toni - (5000,p154) (5267,p121)
Dist: Southern British Columbia to Mexico (5267,p121)
Coll: Ore: Coos Bay (5000,p154)
Hab: Growing on rocks between 4.5 and 2.0 foot tide levels (5000,p154)
Tax: (5174,p126) (5152,p701) (5298,p100); Phyc. Bor. -Amer. No. 68
Str. & Repro: (5174,p130) (5170,p268)

Pelvetiopsis limitata (Setchell) Gardner - (5000,p155) (5267,p122) (5234,p45)
Dist: British Columbia to central Calif. (5000,p155)
Hab: Growing on rocks between 6.0 and 3.5 foot tide levels. Usually on tops of rocks but at times on sides (5000,p155)
Tax: (5174,p127) (5175,p321) (5152,p703)
Str. & Repro: (5174,p103) (5082 as Pelvetia)

Petalonia debilis f. debilis (C. Agardh) Deibès and Solier - (5267,p89)
Ilea Fascia (Müller) Fries - (5000,p126) (5265,p29)
Dist: Alaska to central Calif. (5000,p126)
Hab: Growing on rocks; usually found between 4.0 level and 1.5 foot tide levels but occasionally at lower levels (5000,p126). Narrow forms are relatively common in upper littoral belt (5265,p29)
Tax: (5152,p535)
Str. & Repro: (5168) all as Phyllitis

Phaeostrophion irregulare Setchell and Gardner - (5265,p28) (5234,p39)
Dist: Oregon to Calif. (5152,p586) (5265,p28)
Coll: Ore: Coos Bay, Cape Arago (5265,p28)
Tax: (5150,p10) (5152,p586)

ALGAE - PHAEOPHYTA

Pleurophycus Gardneri Setchell and Saunders - (5265,p30) (5267,p99) (5234,p41)
Dist: Yakutat B., Alaska, to Oregon (5267,p99)
Coll: Ore: Coos Bay, Cape Arago, North Bay, South Bay (5265,p30)
Hab: Growing in association with *Macrocystis integrifolia* at depths below minus four feet.
Tax: (5126,p427) (5152,p607)

Postelsia palmaeformis Ruprecht - (5000,p142) (5267,p105) (5265,p31) (5234,p42)
Dist: British Columbia to central Calif. (5000,p142)
Coll: Ore: Coos Bay, Cape Arago (5265,p31) (5267,p105)
Hab: Growing between the 4.0 and 1.0 foot tide levels on rocks and cliffs exposed to full force of surf (5000,p142) (5265,p31)
Tax: (5024,p220) (5029,p67) (5152,p625); Phyc. Bor.-Amer. No. 38
Str.&Repro: (5108,p112)

Pterygophora californica Ruprecht - (5000,p148) (5267,p107) (5234,p43) (5265,p31)
Dist: British Columbia to northern Baja California (5000,p148) (5265,p31) (5267,p108)
Hab: Growing in extensive beds at a depth of 20-60 feet. Isolated individuals at -1.5 foot tide level. Regularly cast ashore in considerable numbers throughout year (5000,p148)
Tax: (5172,p88) (5024,p220)(5171,p370) (5010,p271) (5152,p634); Phyc. Bor.-Amer. No. 58
Str.&Repro: (5056) (5099) (5102) (5134,p95)

Punctaria expansa Setchell and Gardner - (5267,p86)
Dist: Southern British Columbia to northern Wash. (5267,p86)
Hab: On rocks or epiphytic on other algae in sheltered bays in lower intertidal zone. Frequently floating (5267,p86)
Tax: (5010,p240 in part as *P. latifolia*) (5150,p5) (5152,p521)

Punctaria hesperia Setchell and Gardner - (5000,p124) (5267,p86)
Dist: From Victoria, British Columbia to Monterey Peninsula and San Pedro (5000,p125) (5267,p86)
Hab: Epiphytic on leaves of *Phyllospadix* (5000,p125)
Tax: (5150,p3) (5152,p517)

ALGAE - PHAEOPHYTA

Punctaria orbiculata Jao - (5267,p86)
Dist: Northern Washington (5267,p86)
Hab: Epiphytic on *Zostera* (5267,p86)
Tax: (5259,p109)

Pylaiella littoralis (Linnaeus) Kjellman - (5000,p93) (5234,p32) (5267,p66)
Dist: Bering Sea to southern Calif. (5267,p66) (5000,p93)
Tax: (5152,p402); Phyc. Bor. -Amer. Nos. 171, 414
Str. & Repro: (5091)

Pylaiella tenella Setchell and Gardner - (5000,p94) (5267,p67)
Dist: Northern Washington to Monterey, Calif. (5267,p67)
Coll: Wash: Neah Bay (type loc.) (5000,p94)
Hab: On blades of *Zostera* cast ashore (5000,p94). Epiphytic on *Pleurophycus* and *Zostera* (5267,p67)
Tax: (5148,p385) (5152,p406)
Str. & Repro: (5091)

Pylaiella unilateralis Setchell and Gardner - (5265,p26) (5234,p32)
Dist: Coos Bay, Oregon (5152,p405)
Tax: (5148,p386) (5152,p404)

Pylaiella washingtoniensis Jao - (5267,p67)
Dist: Northern Washington (5267,p67)
Hab: On concrete in upper intertidal zone (5267,p67)
Tax: (5259,p108)

Ralfsia fungiformis (Gunnerus) Setchell and Gardner - (5267,p73) (5265,p27) (5234,p33)
Dist: Bering Sea to Oregon (5267,p73)
Coll: Coos Bay, Cape Arago, Oregon (5265,p27)
Hab: Only sterile plants have been obtained during the collecting periods in June and July (5265,p27)
Str. & Repro: (5150,p11) (5152,p499)

Ralfsia pacifica Hollenberg (mss) - (5000,p95) (5234,p33) (5267,p73)
Dist: Unalaska Bay, Alaska to Baja California (5000,p96) (5267,p73)
Hab: Growing on rocks in upper littoral zone (5000,p96)
Tax: (5024,p200) (5152,p497) (5265,p27 as *Ralfsia verrucosa*)
Str. & Repro: (5079)

ALGAE - PHAEOPHYTA

Sargassum muticum (Yendo) Fensholt - (5267,p123)
Dist: Nanaimo, British Columbia to Coos Bay, Ore. (5267,p123)
Hab: Lower intertidal and upper subtidal (5267,p123)

Saundersella simplex (Saunders) Kylin - (5267,p79)
Dist: Cook Inlet, Alaska to southern British Columbia (5267,p80)
Hab: Epiphytic on Heterochordaria abietina
Tax: (5126,p423 as Mesogloia simplex) (5101,p250 as Mesogloia simplex) (5150,p12 as Gobia simplex) (5152,p576 as Gobia simplex) (5041,p108 as Mesogloia simplex)

Scytosiphon attenuatus (Foslie) Doty - (5234,p38)
Coll: Oregon

Scytosiphon bullosus Sanuders - (5000,p130) (5234,p37) (5267,p88)
Dist: Alaska to Baja California (5000,p131) (5267,p88)
Hab: Growing on rocks between 2.0 and 1.0 foot tide levels (5000,p131)
Tax: (5123,p163)

Scytosiphon Lomentaria f. lomentaria (Lyngbye) J. G. Agardh - (5000,p129) (5267,p88) (5265,p29) (5234,p37)
Dist: Alaska to southern California (5000,p129)
Coll: Ore: Coos Bay, Cape Arago (5265,p29) (5267,p89)
Hab: Growing on rocks between 2.5 and -1.5 foot tide levels (5000,p129)
Tax: (5024,p219) (5123,p163) (5152,p531); Phyc. Bor.-Amer. No. 323

Scytosiphon Lomentaria var. complanatus Rosenvinge - (5000,p130) (5234,p37)
Dist: Southern Oregon to central Calif. (5000,p130)
Coll: Ore: Cape Arago (5000,p130)
Hab: Growing in dense stands on rocks between 5.0 and 2.5 foot tide levels (5000,p130)

Soranthera ulvoidea f. difformis Setchell and Gardner - (5267,p86)
Dist: Bering Sea to northern Washington (5267,p87)
Hab: Epiphytic on species of Rhodomela and Odonthalia (5267,p87)
Tax: (5010,p244) (5152,p526)

Soranthera ulvoidea f. ulvoidea Postels and Ruprecht - (5000,p127) (5267,p87) (5234,p36)
Dist: Alaska to central Calif. (5000,p127)
Coll: Ore: Coos Bay, Cape Arago (5265,p28)
Hab: Epiphytic on Rhodomela larix. Appearing in April and disappearing in September (5000,p127). Epiphytic on Odonthalia (5265,p28) (5234,p36)
Tax: (5123,p165) (5152,p525); Phyc. Bor.-Amer. No. 417
Str. & Repro: (5034) (5035) (5170,p256)

ALGAE - PHAEOPHYTA

Sphacelaria racemosa Greville - (5234,p33) (5267,p73)
Dist: Bering Sea to Oregon (5267,p74)
Hab: On rocks, shells and epiphytic on other algae (5267,p73)
Tax: (5152,p393) (5010,p239 as *S. racemosa* var. *arctica*)

Sphacelaria subfusca Setchell and Gardner - (5267,p74)
Dist: Sitka, Alaska to Redondo, Calif. (5267,p74)
Hab: Epiphytic on various other algae (5267,p74)
Tax: (5150,pl) (5152,p395)

Stictyosiphon tortilis (Ruprecht) Reinke - (5000,pl33) (5267,p85)
Dist: From Alaska to Monterey Peninsula, Calif. (5000,pl33) (5267,p85)
Hab: Attached to fragments of rocks dredged from a depth of 30-35 feet (5000,pl33)
Tax: (5152,p529); Phyc. Bor.-Amer. No. 987

Streblonema aecidioides f. *pacificum* Setchell and Gardner - (5267,p72)
Dist: Southern British Columbia to northern Wash. (5267,p72)
Hab: Endophytic within *Hedophyllum sessile* (5267,p72)
Tax: (5148,p395) (5152,p450)

Streblonema desmarestiae Gardner - (5267,p72)
Dist: Northern Washington (5267,p72)
Hab: Endophytic within *Desmarestia munda* (5267,p72)
Tax: (5290,p267)

Streblonema pacificum Saunders - (5267,p72)
Dist: Yukatat B., Alaska to central Calif., (5267,p72)
Hab: Partially endophytic in larger brown algae (5267,p72)
Tax: (5126,p417)

Streblonema rugosum Setchell and Gardner - (5267,p72)
Dist: Northern Washington (5267,p72)
Hab: Partially endophytic in *Alaria tenuifolia* f. *tenuifolia* (5267,p72)
Tax: (5148,p390) (5152,p449)

Syringoderma abyssicola (Setchell and Gardner) Levring - (5267,p74)
Dist: Northern Washington (5267,p74)
Hab: On shells and stones in subtidal zone at a depth of 5 to 15 fathoms (5267,p74)
Tax: (5150,pl1 as *Chlanidophora abyssicola*) (5152,p658 as *Chlanidophora abyssicola*

ALGAE - PHAEOPHYTA

Thalassiophyllum clathrus (Gmelin) Postels and Ruprecht - (5267, p101)
Dist: Bering Sea to northern Washington (5267, p101)
Hab: On rocks in upper subtidal zone (5267, p101)
Tax: (5296, p213) (5010, p266) (5152, p613)

ALGAE - RHODOPHYTA

Acrochaetium amphiroae (Drew) Papenfuss - (5284, p162)
Dist: Oregon coast (5284, p162)
Hab: On host Calliarthron regenerans (5284, p162)
Tax: (5285, p312)

Acrochaetium Desmarestiae Kylin - (5284, p162) (5267, p133)
Dist: Northern Washington to Oregon (5267, p133) (5284, p162)
Hab: On Desmarestia munda (5284, p162)
Tax: (5094, p10)

Acrochaetium erythrophyllum Jao - (5267, p133)
Dist: Northern Washington (5267, p133)
Hab: Endophytic in Erythrophyllum (5267, p133)
Tax: (5259, p112)

Acrochaetium Macounii (Collins) - (5000, p181) (5267, p134)
Chantransia Macounii - (5041, p113)
Dist: Southern British Columbia to Carmel Bay, Calif. (5267, p134) (5000, p181)
Hab: Epiphytic on Haplogloia andersonii
Str. &Repro: (5176, p80 as Chantransia)

Acrochaetium pacificum Kylin - (5284, p162) (5267, p134)
Dist: Northern British Columbia to Mexico (5267, p134) (5284, p162)
Hab: On Polysiphonia growing on Nereocystis (5284, p162). Epiphytic on red algae, Agarum fimbriatum and worm tubes (5267, p134)
Tax: (5094, p11) (5285, p310)

Acrochaetium plumosum (Drew) - (5000, p180)
Rhodochorton plumosum - (5179, p173)
Dist: Central California (5000, p180)
Str. &Repro: (5176, p80 as Chantransia)

ALGAE - RHODOPHYTA

Acrochaetium rhizoideum (Drew) - (5267) (5000,p180)
    Rhodochorton rhizoideum - (5179,p182)
        Dist: Northern British Columbia to Mexico (5267,p134)
        Hab: Epiphytic on Codium and Cystoseira (5267,p135) (5000,p180)
        Tax: (5259,p102) (5285,p310)
        Str. &Repro: (5176,p80 as Chantransia)

Acrochaetium variabile (Drew) - (5000,p179) (5287,p135) (5284,p162)
    Rhodochorton variabile - (5179,p174)
        Dist: Washington to southern Calif. (5000,p179) (5284,p162) (5267,p136)
        Coll: Ore: (5284,p162) (5287,p136)
        Hab: On Laminaria Andersonii, on Cumagloia Andersonii, on Pterygophora californica (5000,p179)
        Tax: (5285,p311)
        Str. &Repro: (5176,p80 as Chantransia)

Aiodes Gardneri Kylin - (5000,p242) (5265,p36) (5284,p172) (5267,p163)
        Dist: Puget Sound to southern Calif. (5000,p242)
        Coll: Ore: Coos Bay, Cape Arago (5265,p36) (5284,p172) (5267,p164)
        Hab: On rocks at the -1.0 foot tide level
        Tax: (5094,p17)
        Str. &Repro: (5094,p17)

Agardhiella Coulteri (Harvey) Setchell - (5000,p260) (5267,p176)
        Dist: British Columbia to southern Calif. (5000,p260) (5267,p176)
        Hab: Growing on rocks between the 1.0 and -1.5 foot tide levels. Frequently found in tide pools and also dredged from a depth of 20 feet (5000,p260)
        Tax: Setchell in Phyc. Bor.-Amer. No. 333; (5178,p18)
        Str. &Repro: (5114 as Rhabdonia) (5170,p336)

Ahnfeltia concinna J. Agardh - (5284,p179) (5267,p182) (5265,p39)
    Ahnfeltia gigartinoides J. G. Agardh - (5000,p272)
        Dist: British Columbia to southern Calif. (5000,p272)
        Coll: Ore: Coos Bay, Cape Arago (5265,p39) (5284,p179) (5267,p182)
        Hab: Growing on rocks between the 1.0 and -0.5 foot tide levels. Also dredged from a depth of 12-15 feet (5000,p272)
        Tax: (5024,p223)
        Str. &Repro: (5069,p539) (5176)

ALGAE - RHODOPHYTA

Ahnfeltia plicata (Hudson) Fries - (5000,p271) (5267,p183) (5265,p39) (5284,p179)
Dist: Bering Sea to Mexico (5267,p183)
Coll: Ore: Coos Bay, Cape Arago (5265,p39) (5284,p179)
Hab: Growing between mean low tide and -1.5 foot tide levels; usually growing half-buried in sand but at times on rocks free from sand (5000,p271)
Tax: (5029,p68) (5112,p81) (5178,p26); Phyc. Bor.-Amer. No. 743
Str.&Repro: (5069,p539) (5176) .

Amplisiphonia pacifica Hollenberg - (5000,p372) (5267,p239) (5284,p199)
Dist: Oregon (5284,p199) to southern Calif. (5000,p372) (5267,p239) (5284,p199)
Hab: Growing on rocks and on crustose corallines between the 1.0 and -1.0 foot tide levels (5000,p372)
Tax: (5077,p382)
Str.&Repro: (5077)

Antithamnion Baylesiae Gardner - (5000,p313) (5284,p191)
Dist: Oregon (5284,p191) to central Calif. (5000,p314)
Coll: Ore: coast (5284,p191)
Tax: (5065,p375)
Str.&Repro: (5037) (5094,p45) (5117,p356) (5161)

Antithamnion defectum Kylin - (5000,p308) (5265,p41) (5284,p189) (5267,p200)
Dist: Northern British Columbia to Monterey, Calif. (5267,p200)
Coll: Ore: Coos Bay, Cape Arago (5265,p41) (5284,p189)
Hab: On stipe of *Nereocystis Luetkeana*. Dredged from a depth of 30-35 feet (5000,p308)
Tax: (5094,p46)
Str.&Repro: (5037) (5094,p45) (5117,p356) (5161)

Antithamnion densiusculum Gardner - (5000,p313) (5267,p201)
Dist: From Vancouver Island, British Columbia to Pacific Grove, Calif. (5000,p313) (5267,p201)
Hab: Epiphytic on *Calliarthron* (5000,p313)
Tax: (5065,p374)
Str.&Repro: (5037) (5094,p45) (5117) (5161)

Antithamnion floccosum (Müller) Kleen - (5267,p201)
Dist: Southern British Columbia to northern Washington (5267,p201)
Tax: (5094,p47)

Antithamnion glanduliferum Kylin - (5000, p310) (5267, p201) (5265, p41) (5284, p189)
Dist: Puget Sound to central Calif. (5267, p201) (5000, p310)
Coll: Ore: Coos Bay, Cape Arago (5265, p41); coast (5284, p189)
Hab: Growing on rocks or on other algae between mean low tide level and -1.5 foot tide level. Frequently found on stipes (10-20 feet below pneumatocyst) of Nereocystis Luetkeana. Also dredged from a depth of 30-35 feet
Tax: (5094, p47)
Str. &Repro: (5037) (5094, p45) (5117, p356) (5161)

Antithamnion Kylinii Gardner - (5000, p307) (5284, p190) (5267, p202)
Dist: Southern British Columbia to Mexico (5267, p202)
Coll: B. C.: Victoria (type loc.) (5000, p308); Ore: coast (5284, p190)
Hab: On piling, and about ten feet below surface of water (5000, p308)
Tax: (5066, p411)
Str. &Repro: (5037) (5094, p45) (5117, p356) (5161)

Antithamnion nigricans Gardner - (5267, p202)
Dist: Southern British Columbia (5267, p202)
Hab: Epiphytic on stipe of Lessoniopsis littoralis (5267, p202)
Tax: (5066, p409)

Antithamnion occidentale Kylin - (5000, p312) (5284, p190) (5267, p203)
Dist: Alaska to La Jolla, Calif. (5267, p203)
Coll: Oregon coast (5284, p190)
Hab: Growing at mean low tide level on rocks partly buried in sand. On stipe of Nereocystis Luetkeana (5000, p312) (5267, p203)
Tax: (5094, p47)
Str. &Repro: (5037) (5094, p45) (5117, p356) (5161)

Antithamnion pacificum (Harvey) Kylin - (5000, p310) (5267, p203) (5284, p190)
Dist: Alaska to southern Calif. (5000, p311)
Coll: Ore: (5284, p190) (5267, p203)
Hab: On stipes and pneumatocysts of Nereocystis Luetkeana. Usually found only from late autumn to late spring (5000, p311)
Tax: (5094, p47)
Str. &Repro: (5037) (5094, p45) (5117, p356) (5161)

ALGAE - RHODOPHYTA

Antithamnion pygmaeum Gardner - (5000,p309) (5284,p190)
Dist: Oregon to southern Calif. (5284,p190) (5000,p309)
Hab: Growing at mean low tide level. On sponge and forming low creeping patches on rocks (5000,p309)
Tax: (5066,p413)
Str. & Repro: (5037) (5094,p45) (5117,p356) (5161)

Antithamnion subulatum (Harvey) J. G. Agardh - (5000,p312) (5284,p190) (5267,p204)
Dist: Southern British Columbia to Monterey, Calif. (5267,p204)
Coll: Oregon coast (5284,p190)
Hab: Growing at mean low tide level on piles (5000,p313)
Tax: (5094,p50)
Str. & Repro: (5037) (5094,p45) (5117,p356) (5161)

Antithamnion cf. tenuissimum Gardner - (5265,p41) (5284,p190)
Dist: Coos Bay, Cape Arago, Oregon (5265,p41) (5284,p190)
Tax: (5065,p377)

Antithamnion uncinatum Gardner - (5000,p311) (5265,p40) (5267,p204) (5284,p190)
Dist: Puget Sound to central Calif. (5267,p204) (5000,p311)
Coll: Ore: Coos Bay, Cape Arago (5265,p40) (5284,p190)
Hab: On stipe and pneumatocyst of Nereocystis Luetkeana and on Macrocystis pyrifera (5000,p311) (5265,p40)
Tax: (5067,p408)
Str. & Repro: (5037) (5094,p45) (5117,p356) (5161)

Audouinella membranacea (Magnus) Papenfuss - (5267,p138)
Dist: Northern Washington (5267,p138)
Hab: On worm tubes and hydroids to 5-10 fathoms (5267,p138)
Tax: (5094,p45 as Rhodochorton membranaceum) (5179,p186) (5285,p326)

Bangia fuscopurpurea (Dillwyn) Lyngbye - (5267,p126)
Dist: Northern British Columbia to Costa Rica (5267,p126)
Hab: Upper intertidal (5267,p127)
Tax: (5010,p288 as B. atropurpurea f. fuscopurpurea) (5041,p111) (5094,p6)

Bangia tenuis Gardner - (5267,p127)
Dist: Northern Washington (5267,p127)
Hab: Floating in salt water pond (5267,p127)
Tax: (5063,p236)

ALGAE - RHODOPHYTA

Bangia vermicularis Harvey - (5000, p167) (5265, p33) (5284, p159)
Dist: Oregon to central Calif. (5284, p159) (5000, p168)
Hab: Growing between the 5.0 and 2.0 foot tide levels and forming an extensive coating on rocks (5000, p168)
Tax: (5024, p221) (5178, p4); Phyc. Bor. -Amer. No. 582

Bonnemaisonia nootkana (Esper) Silva - (5267, p140)
Bonnemaisonia californica Buffham - (5000, p192)
Dist: British Columbia to southern Calif. (5000, p192) (5267, p141)
Tax: (5181, p181) (5064, p335)
Str. &Repro: (5180, p39)

Bossea frondifera Manza - (5284, p168)
Dist: Oregon coast (5284, p168)
Tax: (5104, p562)
Str. &Repro: (5105, p306)

Bossea Gardneri Manza - (5000, p235) (5284, p169)
Dist: Oregon to Calif. (5284, p169) (5000, p235)
Hab: Growing on rocks between mean low tide and -1.5 foot tide levels (5000, p235)
Tax: (5104, p536) (5105, p306)
Str. &Repro: (5105, p302)

Bossea Orbigniana (Descaisne) Manza - (5000, p235) (5284, p168)
Dist: Cape Arago, Oregon to southern Calif. (5000, p236)
Coll: Oregon coast (5284, p168)
Hab: From depth of 20-35 feet (5000, p236)
Tax: (5104, p563) (5105, p304)
Str. &Repro: (5105, p302)

Bossiella californica (Descaisne) Silva - (5267, p153) (5284, p169)
Bossea californica (Descaisne) Manza - (5000, p233)
Dist: Southern British Columbia to Monterey, Calif. (5267, p154)
Coll: Ore: (5284, p169)
Hab: Growing on rocks between mean low tide and -1.5 foot tide levels (5000, p233)
Tax: (5104, p561) (5105, p305)
Str. &Repro: (5105, p302)

ALGAE - RHODOPHYTA

Bossiella corymbifera (Manza) Silva - (5267,pl54)
  Bossea corymbifera Manza - (5000,p234) (5284,pl69)
    Dist: Southern British Columbia to Pt. Lobos, Calif. (5267,pl54)
    Coll: Ore: (5284,pl69)
    Hab: Growing on rocks between mean low tide and -1.5 foot tide levels (5000,p234)
    Tax: (5104,p562) (5105,p305)
    Str. & Repro: (5105,p302)

Bossiella dichotoma (Manza) Silva - (5267,pl54)
  Bossea dichotoma Manza - (5000,p234)
    Dist: Southern British Columbia to Mexico (5267,pl54)
    Hab: Growing on rocks between mean low tide and -1.5 foot tide levels (5000,p235)
    Tax: (5104,p562) (5105,p307)
    Str. & Repro: (5105,p302)

Bossiella plumosa (Manza) Silva - (5267,pl55)
  Bossea plumosa Manza - (5000,p233) (5284,pl68)
    Dist: Northern British Columbia to Santa Barbara County, Calif. (5267,pl55)
    Coll: Oregon coast (5284,pl68)
    Hab: Growing between 0.5 and -1.5 foot tide levels and either on rocks or on shells of animals (5000,p234)
    Tax: (5103,p46) (5105,p303)
    Str. & Repro: (5105,p302)

Botryocladia pseudodichotoma (Farlow) Kylin - (5000,p297) (5267,pl94)
    Dist: British Columbia to southern Calif. (5000,p297) (5267,pl94)
    Hab: Epiphytic on holdfasts of Macrocystis pyrifera. Most of plants have been collected after winter gales (5000,p297)

Botryoglossum Farlowianum (J. G. Agardh) DeToni - (5000,p354) (5267,p266) (5284,pl96) (5265,p44)
    Dist: Northern Washington to Mexico (5267,p277)
    Coll: Ore: Coos Bay, Cape Arago (5265,p44) (5284,pl96)
    Hab: Growing in dense stands between mean low tide and -1.5 foot tide levels on rocks wherever there is considerable surf. Dredged from depths of 15-35 feet (5000,p354). Epiphytic on Cystoseira (5265,p44)
    Tax: (5178,p34)

Branchioglossum Woodii (J. G. Agardh) Kylin - (5000,p335) (5267,p217)
Dist: Vancouver I., British Columbia to Mexico (5267,p218)
Tax: (5010,p323) (5041,pl19)

Calliarthron pinnulatum Manza - (5267,pl57)
Dist: Northern Washington to Moss Beach, Calif. (5267,pl57)
Tax: (5104,p565)

Calliarthron regenerans Manza - (5284,pl69) (5267,pl58)
Dist: British Columbia to Baja, Calif. (5267,pl58) (5284,pl69)
Tax: (5104,p565) (5105,p269) (5289,p48)
Str. & Repro: (5105,p269)

Calliarthron schmitti Manza - (5267,pl58)
Dist: Northern Washington to San Diego, Calif. (5267,pl58)
Tax: (5104,p566) (5105,p269) (5289,p48)

Callithamnion acutum Kylin - (5267,p206)
Dist: Northern Washington (5267,p206)
Tax: (5094,p55)

Callithamnion biseriatum Kylin - (5000,p319) (5267,p206)
Dist: Friday Harbor (type loc.), Washington to Monterey, Calif. (5000,p320) (5267,p206)
Hab: Epiphytic on Schizymenia epiphytica (5000,p320)
Tax: (5094,p54)
Str. & Repro: (5160)

Callithamnion bisporum Gardner - (5267,p207)
Dist: Northern Washington
Tax: (5066,p403)

Callithamnion laxum Setchell and Gardner - (5066,p407) (5267,p207)
Dist: Southern British Columbia to northern Washington (5267,p207)
Tax: (5010,p339) (5066,p407)

Callithamnion Pikeanum var. laxum (Setchell and Gardner) Doty - (5284,pl91)
Dist: (5284,pl91) Oregon coast

Callithamnion Pikeanum var. pacificum (Harvey) Setchell and Gardner - (5284,pl91) (5267,p207)
Dist: Shumagin Is., Alaska to Oregon (5267,p208) (5284,pl91)
Tax: (5066,p406) (5041,pl24) (5010,p339)

Callithamnion Pikeanum Harvey var. *pikeanum* - (5267,p208) (5000,p318) (5265,p41) (5284,p191)
Dist: Southeastern Alaska to central Calif. (5000,p318)
Coll: Ore: Coos Bay, Cape Arago (5265,p41) (5284,p191) (5267,p208)
Hab: Growing on vertical face of rocks between 3.5 and 1.0 foot tide levels. Common everywhere (5000,p318)
Tax: (5066,p405) (5178,p28)
Str. & Repro: (5160)

Callocolax fungiformis Kylin - (5267,p172)
Dist: Northern Washington (5267,p172)
Hab: Epiphytic on *Callophyllis edentata* (5267,p172)
Tax: (5094,p35)

Callocolax globulosis Dawson - (5267,p172)
Callocolax neglectus Schmitz - (5000,p253)
Dist: Northern Washington to Pt. Loma, southern Calif. (5267,p172)
Hab: On *Callophyllis marginifructa*. Dredged from a depth of 30-35 feet (5000,p253)
Tax: (5267,p172)

Callophyllis crenulata Setchell - (5000,p250 (5284,p175) (5267,p168)
Dist: Northern British Columbia to Calif. (5267,p168) (5000,p251)
Coll: Ore: Oregon coast (5284,p175)
Tax: (5142,p400)

Callophyllis edentata Kylin - (5284,p175) (5267,p168)
Dist: Hope I., British Columbia to Oregon (5267,p169)
Coll: Oregon coast (5284,p175)
Tax: (5094,p34) (5010,p306) (5041,p116) (5034,p34)

Callophyllis firma (Kylin) Norris - (5267,p169)
Pugetia firma Kylin - (5000,p254)
Pugetia fragilissima Kylin - (5094,p30)
Dist: Northern British Columbia to Monterey, Calif. (5267,p169)
Coll: Oregon (5284,p176)
Hab: Growing between the mean low tide and -1.5 foot tide levels on vertical face of sheltered rocks. Abundant in favorable habitats. Also dredged from a depth of 60-75 feet (5000,p254)
Tax: (5178,p15)
Str. & Repro: (5094,p30)

ALGAE - RHODOPHYTA

Callophyllis heanophylla Setchell - (5265,p36) (5284,p175) (5267,p170)
Dist: Southern British Columbia to Oregon (5267,p171)
Coll: Ore: Coos Bay, Cape Arago (5265,p36) (5284,p175)
Tax: (5141,p401) (5094,p34)

Callophyllis marginifructa Setchell and Swezy - (5000,p250)
Callophyllis flabellulata Harvey - (5072,p171) (5267,p170) (5265,p37)
Dist: Northern British Columbia to Oregon (5267,p170)
Coll: Oregon (5284,p174)
Hab: Growing on rocks between mean low tide and -1.0 foot tide levels. Also dredged from a depth of 15-35 feet (5000,p250)
Tax: (5142,p398) (5178,p16) (5010,p306)

Callophyllis megalocarpa Setchell and Swezy - (5000,p251) (5284,p174) (5267,p171) (5265,p36)
Dist: Washington to southern Calif. (5000,p251) (5267,p171)
Coll: Ore: Coos Bay, Cape Arago (5265,p36)
Hab: Growing either in sheltered or exposed localities and on rocks between mean low tide and -1.5 foot tide levels. Only isolated individuals at any station. Also dredged from a depth of 15-20 feet (5000,p251)
Tax: (5142,p401) (5178,p16)

Callophyllis obusifolia J. G. Agardh - (5000,p252) (5265,p37)
Dist: Oregon to southern Calif. (5000,p252) (5265,p37)
Coll: Ore: Coos Bay, Cape Arago (5265,p37)
Hab: Isolated individuals found on rocks between mean low tide and -1.0 foot tide levels (5000,p252)
Tax: (5178,p16)

Callophyllis oregona Doty - (5284,p175)
Dist: Oregon coast (5284,p175)

Callophyllis pinnata Setchell and Swezy - (5000,p251) (5284,p175)
Dist: Oregon coast to central Calif. (5000,p252) (5284,p175)
Tax: (5142,p400)

Callophyllis thompsonii Setchell - (5267,p172)
Dist: Northern Washington (5267,p172)
Tax: (5094,p34)

Callophyllis violacea J. Agardh - (5284,p175)
Dist: Oregon coast (5284,p175)
Hab: Growing with and below *Lessoniopsis* (5284,p175)
Tax: (5178,p16)

Ceramium californicum J. Agardh - (5284,p187) (5267,p210) (5265,p42)
Dist: Southern British Columbia to Mexico (5267,p210) (5284,p187)
Hab: Epiphytic on *Agardhiella* and *Gracilariopsis*
Tax: (5010,p346) (5041,p126) (5178,p29)

Ceramium codicola J. G. Agardh - (5000,p326) (5265,p42) (5267,p211) (5284,p187)
Dist: Alaska to southern Calif. (5000,p327) (5267,p211)
Coll: Oregon coast (5284,p187)
Hab: Found on *Codium fragile*. Abundant locally wherever host is present (5000,p327) (5265,p42) (5284,p187) (5267,p211)
Tax: (5131,p2) (5178,p29); Phyc. Bor.-Amer. No. 248
Str. & Repro: (5117,p361) (5176,p371)

Ceramium Eatonianum (Farlow) DeToni - (5000,p327) (5265,p42) (5284,p187)
Dist: Southern Oregon to southern Calif. (5000,p327)
Coll: Ore: Coos Bay, Cape Arago (5265,p42) (5284,p187)
Hab: Growing between 2.5 and -1.0 foot tide levels. Usually on rocks but occasionally on other algae. Also dredged from a depth of 20-25 feet (5000,p327)
Str. & Repro: (5117,p361) (5176,p371)

Ceramium Gardneri Kylin - (5000,p325) (5265,p42) (5284,p188)
Dist: Southern Oregon to central Calif. (5000,p326)
Coll: Ore: Coos Bay, Cape Arago (5265,p42) (5284,p188)
Hab: Growing on rocks between mean low tide and 1.0 foot tide level. Usually on rocks exposed to heavy surf but at times in sheltered tide pools (5000,p326)
Tax: (5178,p29) (5265,p42 as *C. californicum*)
Str. & Repro: (5117,p361) (5176,p371)

Ceramium pacificum (Collins) Kylin - (5000,p326) (5267,p211) (5265,p42) (5284,p187)
Dist: British Columbia to southern Calif. (5000,p326) (5267,p212)
Coll: Ore: (5284,p187); Coos Bay, Cape Arago (5265,p42)
Hab: Growing on sheltered rocks between 0.5 and -1.0 foot tide levels (5000,p326)
Tax: (5094,p61) (5178,p29)
Str. & Repro: (5117,p361) (5176,p371)

ALGAE - RHODOPHYTA

Ceramium rubrum (Hudson) C. Agardh - (5267,p212)
Dist: Bering Sea to northern Washington (5267,p212)
Tax: (5010,p345) (5041,p125)

Ceramium strictum Harvey - (5267,p212)
Dist: Southern British Columbia (5267,p212)
Tax: (5041,p126) (5298,p100)

Ceramium washingtoniense Kylin - (5267,p213) (5265,p42) (5284,p187)
Dist: Northern Washington to Oregon (5267,p213)
Coll: Ore: Coos Bay, Cape Arago (5265,p42) (5284,p187)
Hab: In higher tide pools (5265,p42)
Tax: (5094,p62)

Choreocolax Polysiphoniae Reinsch - (5000,p255) (5267,p173)
Dist: Sitka, Alaska to Monterey, Calif. (5000,p255) (5267,p173)
Hab: On Polysiphoniae sp. at rocky point (5000,p255)
Tax: (5198,p585) (5016,p278); Phyc. Bor. -Amer. No. 286
Str. & Repro: (5120) (5198)

Conchocelis rosea Batters - (5267,p138)
Dist: Northern Washington (5267,p138)
Hab: Perforating empty shells to 5-10 fathoms (5267,p139)
Tax: (5259,p111)

Constantinea simplex Setchell - (5000,p207) (5265,p35) (5284,p165) (5267,p146)
Dist: Northern Washington to central Calif. (5000,p208) (5265,p35)
Coll: Ore: (5284,p165) (5267,p146)
Hab: Growing on rocks at mean low tide level (5000,p208)
Tax: (5130,p127) (5133,p171)
Str. & Repro: (5185) (5133)

Constantinea subulifera Setchell - (5267,p146)
Dist: Northern British Columbia to northern Washington (5267,p146)
Hab: Lower intertidal and upper subtidal
Tax: (5133,p172)

Corallina densa (Collins) Doty - (5284,p167)
Corallina gracilis forma densa Collins - (5000,p230)
Dist: Oregon and Calif. (5000,p230) (5284,p167)
Hab: Growing between 0.5 and -1.5 foot tide levels on rocks exposed to strong surf. Common on all rocky headlands (5000,p230)
Tax: (5040,p112); Phyc. Bor. -Amer. No. 650
Str. & Repro: (5105,p273)

ALGAE - RHODOPHYTA

Corallina officinalis var. *chilensis* (Harney) Kützing - (5267,pl56)
Corallina chilensis Descaisne - (5000,p230) (5284,pl67)
Dist: British Columbia to southern Calif. (5000,p230)
Coll: Oregon (5284,pl67) (5267,pl56)
Hab: Growing on rocks between 0.5 and -1.5 foot tide levels. Also found in tide pools at higher tidal levels. Common everywhere (5000,p230)
Tax: Phyc. Bor.-Amer. No. 499; (5010,p365) (5041,pl30)
Str.&Repro: (5105,p273)

Corallina pilulifera Postels and Ruprecht - (5267,pl56)
Dist: Alaska to Mexico (5267,pl56)
Tax: (5010,p366)

Corallina vancouveriensis Yendo - (5267,pl56)
Dist: Southern British Columbia to Mexico
Tax: (5041,pl30)

Cryptonemia borealis Kylin - (5284,pl72) (5267,pl62)
Dist: Southern British Columbia to Oregon (5267,pl62) (5284,pl72)
Tax: (5094,pl9)

Cryptonemia obovata J. Agardh - (5267,pl63)
Dist: Prince William Sound, Alaska to La Jolla, Calif. (5267,pl63)
Tax: (5010,p352) (5041,pl28) (5178,pl1)

Cryptonemia ovalifolia Kylin - (5000,p241) (5265,p36) (5284,pl72) (5267,pl63)
Dist: Northern Washington to Pacific Grove, Calif. (5267,pl63)
Coll: Ore: Coos Bay, Cape Arago (5265,p36) (5284,pl72)
Hab: Growing on vertical sides of rocks between 1.0 and -0.5 foot tide levels. Also dredged from 30-40 feet (5000,p241)
Tax: (5178,pl1)
Str.&Repro: (5094,pl9) (5183,pl5)

Cryptopleura brevis Gardner - (5284,pl95)
Dist: Oregon coast (5284,pl95)
Tax: (5063,p241)

Cryptopleura crispa Kylin - (5284,pl96) (5265,p44)
Dist: Oregon (5284,pl96)
Coll: Ore: Sunset Bay, South Bay, Coos Bay, Cape Arago (5265,p44)

Cryptopleura lobulifera (J. G. Agardh) Kylin - (5000,p352) (5265,p44)
Dist: Central Oregon to central Calif. (5000,p352) (5265,p44)
Coll: Ore: Coos Bay, Cape Arago (5265,p44)
Hab: Growing on rocks between 0.5 and -1.5 foot tide levels (5000,p352)
Tax: (5178,p33)

Cryptopleura Ruprechtiana (J. Agardh) Kylin - (5265,p44) (5267,p225) (5284,p195)
Dist: Sitka, Alaska to northern Calif. (5267,p225)
Coll: Ore: Coos Bay, Cape Arago (5265,p44) (5284,p195)
Hab: Growing on Cystoseira
Tax: (5010,p321) (5041,p118)

Cryptopleura violacea (J. G. Agardh) Kylin - (5000,p352) (5267,p226) (5284,p196) (5265,p44)
Dist: British Columbia to southern Calif. (5000,p353)
Coll: Ore: Coos Bay, Cape Arago (5265,p44) (5284,p196) (5267,p226)
Hab: Growing on rocks between 0.5 and -1.5 foot tide levels. Also dredged from depth of 15-30 feet (5000,p353)
Tax: (5178,p33)

Cryptosiphonia Woodii J. G. Agardh - (5000,p200) (5267,p142) (5284,p163) (5265,p35)
Dist: Unalaska, Alaska to Venice, Calif. (5000,p200) (5265,p35) (5288,p163) (5267,p142)
Coll: Ore: (5284,p163) (5267,p142)
Hab: Growing on rocks between 2.5 and 0.5 foot tide levels (5000,p200)
Tax: (5024,p222) (5029,p68) (5183,p4) (5178,p8); Phyc. Bor. - Amer. No. 449
Str. & Repro: (5183,p4) (5170,p329)

Cumagloia Andersonii (Farlow) Setchell and Gardner - (5000,p189) (5284,p162) (5267,p139) (5265,p34)
Dist: British Columbia to southern Calif. (5000,p189)
Coll: Ore: Coos Bay, Cape Arago (5265,p34) (5284,p162) (5267,p139)
Hab: Growing on horizontal and vertical sides of rocks between 4.0 and 2.0 foot tide levels (5000,p189)
Tax: (5028,p399) (5178,p6)
Str. & Repro: (5028,p398) (5170,p318)

ALGAE - RHODOPHYTA

Dasyopsis plumosa (Harvey and Bailey) Schmitz - (5267,p227)
Dist: Queen Charlotte Sound, British Columbia to northern Calif. (5267,p227)
Tax: (5010,p337) (5041,p123) (5094,p68) (5298,p100)

Delesseria decipiens J. G. Agardh - (5000,p338) (5267,p220) (5265,p43) (5284,p192)
Dist: Alaska to central Calif. (5000,p339)
Coll: Ore: Coos Bay, Cape Arago (5265,p43) (5284,p192) (5267,p220)
Hab: Growing on rocks between 0.5 and -1.5 foot tide levels (5000,p339)
Tax: (5024,p224)

Dermatolithon dispar (Foslie) Foslie - (5267,p152)
Fosliella dispar (Foslie) Smith - (5000,p225)
Dist: Whidbey Island, Wash. to Monterey Peninsula (5000,p225) (5267,p152)
Hab: Growing on Ahnfeltia plicata, Gelidium Coulteri, Gigartina volans, and Gymnogongrus linearis (5000,p225)
Tax: Lithophyllum tumidulum var. dispar Foslie (5191,p27) (5111,p357)

Dilsea californica (J. Agardh) Schmitz - (5265,p37)
Dilsea californica (J. Agardh) O. Kuntze - (5267,p145) (5284,p165)
Dist: Unga I., Alaska to San Francisco, Calif. (5267,p145)
Coll: Coos Bay, Cape Arago (5265,p37); Oregon coast (5284,p165)
Hab: On rocks in lower littoral belt (5265,p37)

Endocladia muricata (Postels and Ruprecht) J. G. Agardh - (5284,p166) (5000,p211) (5267,p160) (5265,p36)
Dist: Alaska to southern Calif. (5000,p211)
Coll: Ore: Coos Bay, Cape Arago (5265,p36) (5267,p160)
Hab: Growing on vertical sides of rocks between 6.0 and 3.0 foot tide levels. Common everywhere on rocks exposed to moderate or strong surf (5000,p211)
Tax: (5024,p223) (5029,p68) (5178,p7); Phyc. Bor.-Amer. Nos. 136, 882

Erythrotrichia kylinii Gardner - (5267,p125)
Dist: Bering Sea to northern Washington (5267,p125)
Hab: Epiphytic on other algae and worm tubes in lower intertidal and upper subtidal to 5-10 fathoms (5267,p125)
Tax: (5010,p292 as E. ceramicola) and (5041,p112) (5094,p8 as E. bertholdii) (5063,p236)

ALGAE - RHODOPHYTA

Erthrotrichia parksii var. minor Gardner - (5267,pl25)
Dist: Southern British Columbia to northern Wash. (5267,pl25)
Hab: Epiphytic on Cryptosiphonia (5267,pl25)
Tax: (5063,p239)

Erythrotrichia pulvinata Gardner - (5000,pl64) (5284,pl59)
Dist: Oregon to central Calif. (5284,pl59) (5000,pl64)
Hab: On side of branches of Ceramium codicola (5000,pl64)
Tax: (5063,p238)

Erythrotrichia Welwitschii (Ruprecht) Batters - (5000,pl63) (5284,pl59)
Dist: Monterey Peninsula (5000,pl63)
Coll: Oregon (5284)
Hab: On rocks in a tide pool at 1.0 foot tide level (5000,pl63)

Erythrocladia irregularis Rosenvinge - (5000,pl66) (5267,pl25) (5284,pl59)
Dist: Friday Harbor, Washington to Monterey Peninsula (5000,pl66)
Coll: Oregon (5284,pl59) (5267,pl25)
Hab: On margins of blades of Porphyra variegata (5000,pl66)
Tax: (5176,p72) (5094,p9)
Str. & Repro: (5177,pl12) (5176,p71)

Erythrocladia subintegra Rosenvinge - (5000,pl66) (5267,pl26) (5284,pl59)
Dist: From Friday Harbor, Washington to Monterey Peninsula (5000,pl66) (5267,pl26)
Coll: Oregon coast (5284,pl59)
Hab: Growing on various algae (5000,pl66)
Tax: (5176,p73) (5094,p9) (5178,p3)
Str. & Repro: (5177,pl12) (5176,p71)

Erythroglossum californicum J. G. Agardh - (5000,p339) (5284,pl92)
Dist: Oregon coast to central Calif. (5284,pl92) (5000,p340)
Hab: Growing on a sponge at -1.0 foot tide level (5000,p340)
Tax: (5178,p31)

Erthroglossum intermedium (J. Agardh) Kylin - (5267,p221)
Dist: Southern British Columbia (5267,p221)

Erthrophyllum delesserioides J. G. Agardh - (5000,p292) (5267,pl73) (5284,pl84) (5265,p37)
Dist: Alaska to central Calif. (5000,p292)
Coll: Ore: (5284,pl84); Coos Bay, Cape Arago (5265,p37) (5267,pl73)

Erthrophyllum delesserioides J. G. Agardh - continued
Hab: Growing between mean low tide and -1.5 foot tide levels on rocks exposed on heavy surf (5000,p292)
Tax: (5024,p224) (5029,p68) (5178,p17); Phyc. Bor.-Amer. Nos. 50, 588
Str. & Repro: (5201)

Erythrophyllum splendens Doty - (5284,p184)
Dist: Oregon (5284)

Euthora fruticulosa (Ruprecht) J. Agardh - (5267,p178)
Dist: Bering Sea to northern Washington (5267,p178)
Tax: (5010,p311) (5041,p117) (5094,p39)

Fauchea laciniata J. Agardh - (5284,p185) (5267,p192)
Fauchea media Kylin - (5000,p295)
Dist: Southern British Columbia to Mexico (5267,p193)
Hab: Growing on rocks between mean low tide and -1.5 foot tide levels (5000,p295)
Tax: (5178,p27)
Str. & Repro: (5183,p25)

Faucheocolax attenuata Setchell - (5000,p296) (5267,p193)
Dist: Northern Washington to Monterey, Calif. (5267,p193)
Hab: Parasitic on Fauchea media (5000,p296)
Tax: (5141,p394)
Str. & Repro: (5141,p394)

Farlowia crassa J. G. Agardh - (5000,p205)
Dist: Southern Oregon to southern Calif. (5000,p205)
Coll: Oregon (type loc.) (5000,p205); Port Orford (5000,p205)
Hab: Growing on rocks between 0.5 and -0.5 foot tide levels (5000,p205)
Tax: (5024,p222)

Farlowii mollis (Harvey and Bailey) Farlow and Setchell - (5284,p164) (5000,p204) (5267,p144) (5265,p35)
Dist: British Columbia to central Calif. (5000,p205)
Coll: Ore: (5267,p144); Coos Bay, Cape Arago (5265,p35)
Hab: Growing attached to rocks between 0.5 and -1.5 foot tide levels (5000,p204)
Tax: Farlow and Setchell in Phyc. Bor.-Amer. No. 898. Also see Phyc. Bor.-Amer. No. 1150.

Fryeella Gardneri (Setchell) Kylin - (5284,pl86) (5267,pl93)
Dist: Southern British Columbia to Oregon (5267,pl93)

Gastroclonium Coulteri (Harvey) Kylin - (5000,p303) (5267,pl99)
Dist: Southern British Columbia to Mexico (5267,pl99)
Hab: Growing on rocks between 2.0 and -1.5 foot tide levels. Common everywhere. Also dredged from depths between 15-25 feet (5000,p303)
Tax: (5178,p27)
Str. &Repro: (5170,p339)

Gelidium caloglossoides Howe - (5000,pl94) (5284,pl63)
Dist: Oregon to southern Calif. (5000,pl95) (5284,pl63)
Hab: Growing on vertical face of rocks between 0.5 and -1.0 foot tide levels (5000,pl95)
Tax: (5182,p96) (5080,p534)
Str. &Repro: (5170,p325)

Gelidium Coulteri Harvey - (5000,pl96) (5265,p35) (5284,pl63)
Dist: Oregon to southern Calif. (5284,pl63) (5000,pl96)
Coll: Ore: Coos Bay, Cape Arago (5265,p35)
Hab: Growing on rocks between 2.5 and -0.5 foot tide levels. Frequently with base buried in sand. Abundant everywhere (5000,pl96)
Tax: (5024,p224) (5178,p7); Phyc. Bor.-Amer. No. 90
Str. &Repro: (5170,p325)

Gelidium crinale (Turner) Lamouroux - (5267,pl42)
Dist: Southern British Columbia to Mexico (5267,pl42)
Hab: Lower intertidal and subtidal (5267,pl42)
Tax: (5010,p295) (5041,pl14) (5094,pl3) (5298,pl00 as G. amansii)

Gelidium pulchrum Gardner - (5265,p35) (5284,pl63)
Dist: Oregon coast (5284,pl63)
Coll: Lighthouse Reef, North Bay, Coos Bay, Lighthouse Beach (5265,p35)
Hab: On lower rocks and washed ashore (5265,p35)
Tax: (5068,p279)

Gelidium pusillum (Stackhouse) Le Jolis - (5000,pl95) (5284,pl63)
Dist: Oregon coast to Monterey Peninsula (5000,pl95) (5284,pl63)
Hab: Growing on vertical face of rocks between 3.0 and -1.0 foot tide levels (5000,pl95)
Str. &Repro: (5170,p325)

ALGAE - RHODOPHYTA

Gigartina cristata (Setchell) Setchell and Gardner - (5000,p283) (5267,p185) (5284,p180) (5265,p38)
Dist: Northern Washington to Mexico (5267,p185)
Coll: Wash: Westport (5000,p284); Ore: Coos Bay, Cape Arago (5265,p38) (5284,p180)
Hab: Growing on rocks between 2.0 foot and mean low tide levels (5000,p284)
Tax: (5153,p289) (5178,p26)
Str. &Repro: (5183,p46)

Gigartina exasperata Harvey and Bailey - (5284,p181) (5267,p185)
Dist: Northern Washington to Mexico (5267,p185) (5284,p181)
Tax: (5288,p371) (5153,p275)

Gigartina Harveyana (Kützing) Setchell and Gardner - (5000,p282) (5284,p181)
Dist: Oregon to southern Calif. (5284,p181) (5000,p282)
Hab: Growing between 1.0 and -1.5 foot tide levels on rocks more or less covered with sand. Very abundant in sandy coves. Also dredged from a depth of 25 feet (5000,p282)
Tax: (5153,p276) (5178,p25)
Str. &Repro: (5183,p46)

Gigartina latissima (Harvey) Eaton - (5267,p187)
Dist: Table I., British Columbia to northern Washington (5267,p187)
Tax: (5041,p115) (5094,p29) (5153,p284)

Gigartina mamillosa (Goodenough and Woodward) J. Agardh - (5284,p180) (5267,p187)
Dist: Southern British Columbia to Oregon (5267,p187) (5284,p180)
Tax: (5153,p285) (5010,p302) (5041,p115) (5094,p29) (5298,p100)

Gigartina papillata (C. A. Agardh) J. G. Agardh - (5000,p283) (5284,p180) (5267,p188)
Dist: Northern Washington to Mexico (5267,p188)
Coll: Oregon (5284,p180)
Hab: Growing on rocks between 3.5 and 1.0 foot tide levels. Abundant everywhere (5000,p283)
Tax: (5024,p223) (5029,p68) (5153,p287)
Str. &Repro: (5183,p46)

Gigartina sitchensis Ruprecht - (5267,p188)
Dist: Sitka, Alaska to northern Washington (5267,p188)
Tax: (5153,p284)

Gigartina stellata (Stackhouse) Batters - (5267,p188)
Dist: Southern British Columbia (5267,p188)
Tax: (5153,p286)

ALGAE - RHODOPHYTA

Gelidium sinicola Gardner - (5000,p195) (5284,p163)
Dist: Oregon coast to central Calif. (5284,p163) (5000,p196)
Hab: Growing on rocks at mean low tide level (5000,p196)
Tax: (5068,p278)
Str.&Repro: (5170,p325)

Gigartina Agardhii Setchell and Gardner - (5000,p284) (5265,p38)
Dist: Central Oregon to southern Calif. (5000,p284) (5265,p38)
Coll: Ore: Coos Bay, Cape Arago (5265,p38)
Hab: Growing on rocks between 3.5 and 1.0 foot tide levels. Abundant everywhere (5000,p284)
Tax: (5153,p290) (5178,p26)
Str.&Repro: (5183,p46)

Gigartina Binghamiae J. Agardh - (5265,p38) (5267,p184) (5284,p181)
Dist: Northern Washington to Mexico (5267,p185)
Coll: Oregon (5284,p181); Coos Bay (5265,p38)
Tax: (5153,p277)

Gigartina californica J. G. Agardh - (5000,p280) (5265,p38) (5284,p181)
Dist: Oregon to central Calif. (5284,p181) (5000,p281)
Coll: Ore: Coos Bay, Cape Arago (5265,p38)
Hab: Growing between mean low tide and -1.5 foot tide levels on rocks more or less directly exposed to surf. Abundant on all rocky headlands (5000,p281)
Tax: (5153,p272) (5178,p25)
Str.&Repro: (5183,p46)

Gigartina canaliculata Harvey - (5000,p278) (5265,p38) (5284,p181)
Dist: Central Oregon to Baja Calif. (5000,p278) (5284,p181) (5265,p38)
Coll: Ore: Coos Bay, Cape Arago (5265,p38)
Hab: Growing on rocks between 2.0 and -1.0 foot tide levels (5000,p278)
Tax: (5024,p223) (5029,p68) (5153,p264) (5178,p25); Phyc. Bor.-Amer. No. 1395
Str.&Repro: (5183,p46)

Gigartina corymbifera (Kützing) J. G. Agardh - (5000,p281) (5267,p185) (5265,p38)
Dist: Central Oregon to southern Calif. (5000,p281) (5265,p38) (5267,p185)
Coll: Ore: Coos Bay, Cape Arago (5265,p38) (5267,p185)
Hab: Growing between mean low tide and -1.5 foot tide levels on rocks more or less directly exposed to surf. Abundant on all rocky headlands. Also dredged from depth of 20-25 feet (5000,p281)
Tax: (5153,p275) (5178,p25)
Str.&Repro: (5183,p46)

ALGAE - RHODOPHYTA

Gigartina unalaschcensis (Ruprecht) Ruprecht - (5267,pl89)
Dist: Bering Sea to northern Washington (5267,pl89)
Tax: (5153,p282)

Gigartina volans (C. A. Agardh) J. G. Agardh - (5000,p282) (5284,pl80) (5265,p39)
Dist: Oregon to southern Calif. (5000,p283)
Coll: Ore: Coos Bay, Cape Arago (5265,p39) (5284,pl80)
Hab: Growing on rocks between 1.5 and -0.5 foot tide levels (5000,p283)
Tax: (5024,p223) (5029,p68) (5153,p279); Phyc. Bor.-Amer. No. 21

Gloiopeltis furcata (Postels and Ruprecht) J. Agardh - (5265,p35) (5267,pl61) (5284,pl66)
Dist: Aleutian Is., Alaska to Oregon (5267,pl61)
Coll: Ore: Coos Bay, Cape Arago (5265,p35) (5267,pl61)
Hab: Growing in high intertidal zone in association with Endocladia and Pelvetiopsis
Tax: (5010,p348) (5041,pl27) (5094,pl6)

Gloiophloea confusa Setchell - (5000,pl90) (5265,p35) (5267,pl39) (5284,pl63)
Dist: British Columbia to southern Calif. (5000,pl91)
Coll: Ore: Coos Bay, Cape Arago (5265,p35) (5267,pl40) (5284,pl63)
Hab: Growing on rocks between 0.5 and -1.5 foot tide levels. Also dredged from a depth of 25 feet (5000,pl90)
Tax: (5136,pl18) (5178,p6)

Gloiosiphonia californica (Farlow) J. G. Agardh - (5000,p209) (5267,pl58) (5284,pl66)
Dist: Alaska to Mexico (5267,pl59) (5000,p209)
Hab: Growing on rocks between 1.5 and -0.5 foot tide levels. Usually found only during spring and early summer (5000,p209)
Str.&Repro: (5183,pl2) (5010,p348) (5094,pl6)

Gloiosiphonia capillaris (Hudson) Carmichael - (5267,pl59)
Dist: Southern British Columbia (5267,pl59)
Tax: (5041,pl27)

ALGAE - RHODOPHYTA

Gloiosiphonia verticillaris Farlow - (5000,p209) (5267,p159) (5284,p166) (5265,p35)

Dist: Alaska to central Calif. (5000,p210) (5265,p35)
Coll: Ore: Coos Bay, Cape Arago (5267,p159)
Hab: Growing on sand-covered rocks between 1.5 and 0.5 foot tide levels. Usually found only during spring and early summer (5000,p210)
Tax: (5053,p3); Phyc. Bor.-Amer. No. 100
Str. &Repro: (5183,p12)

Gonimophyllum Skottsbergii Setchell - (5000,p355) (5267,p227)

Dist: Northern Washington to San Diego, Calif. (5267,p227)
Hab: Parasitic on *Botryoglossum Farlowianum*. Parasitic on *Cryptopleura violacea* and *Hymenena multiloba* (5000,p335)
Tax: (5141,p394) (5178,p34)
Str. &Repro: (5205)

Goniotrichum cornu-cervi (Reinsch) Hauck - (5267,p124)

Dist: Northern Washington to Santa Cruz, Calif. (5267,p124)
Hab: Epiphytic on other algae and worm tubes in subtidal to 5-10 fathoms (5267,p124)
Tax: (5094,p6)

Goniotrichum elegans (Chauvin) Zanardini - (5000,p161) (5267,p124)

Dist: Friday Harbor, Washington to Mexico (5267,p124) (5000,p161)
Hab: On *Abietinaria* sp. at mean low tide level. Also dredged from depths 20-40 feet (5000,p161)
Tax: (5176,p75); Phyc. Bor.-Amer. No. 781; (5178,p3)
Str. &Repro: (5176,p75)

Gracilaria verrucosa (Hudson) Papenfuss - (5267,p181)

Dist: Southern British Columbia to Mexico (5267,p181)
Tax: (5010,p312) (5041,p117) (5094,p39) (5298,p100)

Gracilariophila oryzoides Setchell and Wilson - (5000,p268) (5284,p178) (5265,p39)

Dist: Southern Oregon to southern Calif. (5000,p269)
Coll: Ore: Coos Bay, Cape Arago (5265,p39)
Hab: Parasitic on *Gracilaria Sjoestedtii* (5000,p269); epiphytic on *Gracilaria Sjoestedtii* (5265,p39)
Tax: Setchell and Wilson (5164,p81)
Str. &Repro: (5164)

ALGAE - RHODOPHYTA

Gracilariopsis Sjoestedtii (Kylin) Dawson - (5267,p181) (5284,p178)
Gracilaria Sjoestedtii Kylin - (5000,p267) (5265,p39)
Dist: British Columbia to Baja, Calif. (5000,p267)
Coll: Ore: Coos Bay, Cape Arago (5265,p39) (5267,p182)
Hab: Growing half-buried in sand between rocks at 1.0 and 1.5 foot tide levels. Also dredged from a depth of 30-60 feet (5000, p267) (5265,p39)
Tax: (5178,p21)
Str.&Repro: (5183,p51)

Grateloupia californica Kylin - (5000,p239) (5265,p36) (5267,p161)
Dist: Puget Sound to southern Calif. (5000,p239)
Coll: Ore: Coos Bay, Cape Arago (5265,p36) (5267,p161)
Tax: (5178,p9) (5010,p349) (5041,p127) (5094,p18)

Grateloupia pinnata (Postels and Ruprecht) Setchell - (5297,p947) (5267,p162)
Dist: Sitka, Alaska, to northern Washington (5267,p162)
Tax: (5297,p947) (5010,p349) (5041,p127) (5094,p18)

Griffithsia pacifica Kylin - (5000,p324) (5265,p41) (5267,p210) (5284,p192)
Dist: Puget Sound to southern Calif. (5267,p210) (5000,p324)
Coll: Ore: Coos Bay, Cape Arago (5265,p41) (5284,p192)
Tax: (5094,p58) (5178,p28)
Str.&Repro: (5094,p58) (5098)

Gymnogongrus leptophyllus J. G. Agardh - (5000,p273) (5284,p179)
Dist: Oregon to southern Calif. (5000,p273) (5284,p179)
Tax: (5024,p223) (5178,p26)
Str.&Repro: (5069,p532)

Gymnogongrus linearis (Turner) J. G. Agardh - (5000,p274) (5284,p179) (5265,p39)
Dist: Southern Oregon to central Calif. (5000,p274)
Coll: Ore: Coos Bay, Cape Arago (5265,p39) (5284,p179)
Tax: (5024,p223) (5029,p68); Phyc. Bor.-Amer.Nos. 238,1496
Str.&Repro: (5069,p532)

Gymnogongrus norvegicus (Gunner) J. Agardh - (5267,p183)
Dist: Southern British Columbia to northern Washington (5267,p184)
Tax: (5041,p114)

Halosaccion glandiforme (Gmelin) Ruprecht - (5000,p298) (5267,p194) (5284,p186)
Dist: Alaska to Mexico (5267,p195) (5000,p298)
Coll: Ore: Coos Bay, Cape Arago (5265,p40) (5284,p186)
Tax: (5010,p317) (5178,p27); Phyc. Bor.-Amer. No. 71

ALGAE - RHODOPHYTA

Halymenia californica Smith and Hollenberg - (5000,p243) (5267,p164)
Dist: Northern Washington to Mexico (5267,p164)
Hab: Dredged from a depth of 30-35 feet (5000,p243)
Tax: (5158,p216)

Herposiphonia grandis Kylin - (5265,p45) (5267,p238)
Dist: Southern British Columbia to Oregon (5267,p238)
Coll: Ore: Sunset Bay, Coos Bay, Cape Arago (5265,p45)
Tax: (5041,p120) (5094,p74)

Herposiphonia parva Hollenberg - (5284,p199) (5267,p239)
Herposiphonia pygmaea Hollenberg mss. - (5000,p369)
Dist: Northern Washington to Mexico (5267,p239)
Coll: Oregon (5284,p199)
Hab: On Calliarthron and Bossea spp. dredged from a depth of 20-25 feet and from 35-40 feet (5000,p370)
Tax: (5287,p575)
Str.&Repro: (5206,p286)

Herposiphonia rigida Gardner - (5000,p369) (5284,p199) (5267,p239)
Dist: Puget Sound to southern Calif. (5000,p369)
Coll: Oregon (5284,p199) (5267,p239)
Hab: Growing on rocks between the mean low tide and - 1.0 foot tide levels. Also dredged from a depth of 30-35 feet (5000,p369)
Tax: (5067,p100)
Str.&Repro: (5206,p286)

Heterosiphonia densiuscula Kylin - (5267,p228)
Dist: Northern Washington (5267,p228)
Tax: (5094,p70)

Heterosiphonia laxa Kylin - (5267,p228)
Dist: Southern British Columbia to northern Washington (5267,p229)
Tax: (5094,p70)

Hildenbrandia occidentalis Setchell - (5000,p215) (5267,p147) (5284,p167)
Dist: Puget Sound to central Calif. (5000,p215)
Coll: Oregon (5284,p167) (5267,p148)
Hab: Growing on rocks slightly below the high tide level (5000,p215)
Tax: (5028,p393)
Str.&Repro: (5176,p202)

Hildenbrandia prototypus Nardo - (5000,p215) (5267,p148)
Dist: Alaska to Panama (5000,p215) (5267,p148)
Hab: Growing on rocks in mid-littoral (5000,p215)
Str.&Repro: (5176,p202)

ALGAE - RHODOPHYTA

Hildenbrandia rosea Kützing - (5267,p148)
Dist: Northern Washington to Mexico (5267,p148)
Hab: Intertidal and subtidal (5267,p148)
Tax: (5094,p27)

Holmesia californica (Dawson) Dawson - (5267,p219)
Dist: Northern Washington to San Diego, Calif. (5267,p219)

Hymenena cuneifolia Doty - (5284,p195)
Dist: Oregon coast (5284,p195)

Hymenena flabelligera (J. G. Agardh) Kylin - (5000,p348) (5267,p224) (5284,p193) (5265,p43)
Dist: Puget Sound to central Calif. (5000,p349)
Coll: Ore: Coos Bay, Cape Arago (5265,p43) (5284,p193) (5267,p224)
Hab: Growing between 1.0 and -1.0 foot tide levels on vertical face of rocks exposed to considerable surf (5000,p349)

Hymenena Kylinii Gardner - (5000,p349) (5284,p194)
Dist: Oregon to central Calif. (5284,p194) (5000,p349)
Hab: Growing at mean low tide level on rocks (5000,p349)
Tax: (5063,p242) (5178,p32)

Hymenena multiloba (J. G. Agardh) Kylin - (5000,p350) (5284,p193)
Dist: Oregon coast to central Calif. (5000,p350) (5284,p193)
Hab: Growing on rocks and on crustose corallines between low tide and -1.0 foot tide levels (5000,p350)

Hymenena Setchellii Gardner - (5000,p350) (5265,p43) (5267,p224) (5284,p194)
Dist: Hope I., British Columbia to central Calif. (5267,p225) (5000,p350)
Coll: Ore: Coos Bay, Cape Arago (5265,p43) (5284,p194)
Hab: Growing on rocks at mean low tide level (5000,p350)
Tax: (5063,p245)

Hymenena Smithii Kylin - (5000,p351) (5284,p194)
Dist: Oregon coast to central Calif. (5000,p351) (5284,p194)
Hab: On stipe of Pterygophora californica (5000,p351)
Tax: (5178,p33)

Iridaea cordata (Turner) Bory - (5267,p190)
Iridophycus cordatum (Turner) Setchell and Gardner - (5284,p184)
Dist: Banks I., British Columbia to Oregon (5267,p190) (5284,p184)
Tax: (5154,p170) (5041,p115) (5094,p28) (5298,p100) (5010,p298)

ALGAE - RHODOPHYTA

Iridaea coriacea (Setchell and Gardner) Scagel - (5267,p190) (5284,p183)
Iridophycus coriaceum Setchell and Gardner - (5000,p290)
Dist: Northern Washington to central Calif. (5000,p290)
Coll: Wash: Neah Bay (5000,p290), Ore: (5284,p183) (5267,p191)
Hab: Growing between 1.0 and -1.0 foot tide levels on rocks exposed to strong surf (5000,p290)
Tax: (5154,p170)
Str.&Repro: (5170,p334)

Iridaea heterocarpa Postels and Ruprecht - (5267,p191)
Iridophycus heterocarpum (Postels and Ruprecht) Setchell and Gardner - (5000,p291) (5265,p38) (5284,p183)
Dist: British Columbia to central Calif. (5000,p291)
Coll: Ore: Coos Bay, Cape Arago (5265,p38) (5284,p183) (5267,p191)
Hab: Growing between 2.0 foot tide and mean low tide levels on rocks exposed to considerable surf (5000,p291)
Tax: (5154,p170)
Str.&Tax: (5170,p334)

Iridaea Whidbeyanum (Setchell and Gardner) Scagel - (5267,p191)
Iridophycus Whidbeyanum Setchell and Gardner - (5284,p184)
Dist: Southern British Columbia to Oregon (5267,p192) (5284,p184)
Tax: (5154,p172)

Iridophycus flaccidum Setchell and Gardner - (5000,p288) (5284,p182) (5265,p37)
Dist: Oregon to central Calif. (5284,p182) (5000,p289)
Coll: Ore: Coos Bay, Cape Arago (5265,p37)
Hab: Abundant everywhere on rocks in mid-littoral zone. Also found between 0.5 and -0.5 foot tide levels (5000,p288)
Tax: (5154,p171)
Str.&Repro: (5170,p334)

Iridophycus fulgens Setchell and Gardner - (5284,p184)
Dist: Oregon coast (5284,p184)
Tax: (5154,p173)

Iridophycus lineare Setchell and Gardner - (5000,p290) (5284,p182)
Dist: Oregon coast to southern Calif. (5000,p291) (5284,p182)
Coll: Ore: Sunset Bay (5000,p291)
Hab: Growing between 1.0 and -1.0 foot tide levels on rocks exposed to heavy surf (5000,p291)
Tax: (5154,p171)
Str.&Repro: (5170,p334 as Iridaea)

Iridophycus oregonum Doty - (5284,p182)
Dist: Oregon (5284)

ALGAE - RHODOPHYTA

Iridophycus parvulum (Kjellman) Setchell and Gardner - (5284,p183)
Dist: Oregon (5284,p183)
Tax: (5154,p170); Phyc. Bor.-Amer. fasc. 19:930

Iridophycus sanguineum Setchell and Gardner - (5000,p289) (5284,p184)
Dist: Southern Oregon to central Calif. (5000,p290)
Coll: Ore: Cape Arago (5000,p290) (5284,p184)
Tax: (5154,p172)
Str. &Repro: (5170,p334 as Iridaea)

Iridophycus splendens Setchell and Gardner - (5000,p289) (5284,p182)
Dist: Oregon to southern Calif. (5000,p289) (5284,p182)
Coll: Ore: Cape Kiawandi (5000,p289) (5284,p182)
Hab: Growing between 1.0 and -1.0 foot tide levels on rocks somewhat sheltered from surf (5000,p289)
Tax: (5154,p170)
Str. &Repro: (5170,p334 as Iridaea)

Janczewskia Gardneri Setchell and Guernsey - (5000,p381)(5267,p241)
Dist: Southern British Columbia to Mexico (5267,p241)
Coll: Oregon (5284,p199)
Tax: Setchell and Guernsey (5137,p12) (5178,p43)

Joculator delicatulus Doty - (5284,p167)
Dist: Oregon coast (5284,p167)
Tax: (5103)

Kallymenia oblongifructa Setchell - (5267,p166)
Dist: Sitka, Alaska to northern Washington (5267,p167)
Hab: Epiphytic on stipes of Pleurophycus and Pterygophora (5267,p167)
Tax: (5010,p300) (5130,p123) (5094,p35)

Kallymenia ornata (Postels and Ruprecht) J. Agardh - (5267,p167)
Dist: Yakutat B., Alaska to southern British Columbia (5267,p167)
Tax: (5010,p307) (5041,p116)

Kallymenia reniformis (Turner) J. Agardh - (5267,p167)
Dist: Southern British Columbia (5267,p167)
Tax: (5010,p307) (5041,p116)

Kylinia arcuata (Drew) Kylin - (5267,p136)
Dist: Northern Washington to Mexico (5267,p136)
Hab: Epiphytic on Pterosiphonia bipinnata var. bipinnata, Pterochondria woodii, and species of Polysiphonia (5267,p136)
Tax: (5179,p165 as Rhodochorton arcuatum) (5285,p321 as Chromastrum arcuatum)

Kylinia hirsuta (Drew) Kylin - (5267,p136)
Dist: Southern British Columbia (5267,p136)
Hab: Epiphytic on species of *Polysiphonia* (5267,p136)
Tax: (5041,p167 as *Chantrasia hallandica*) (5179,p166 as *Rhodochorton hirsutum*) (5285,p321 as *Chromastrum hirsutum*)

Kylinia moniliformis (Rosenvinge) Kylin - (5267,p136)
Dist: Southern British Columbia (5267,p137)
Hab: Epiphytic on species of *Polysiphonia* (5267,p137)
Tax: (5041,p113 as *Chantrasia moniliformis*) (5179,p164 as *Rhodochorton moniliforme*) (5285,p322 as *Chromastrum moniliforme*)

Laurencia spectabilis Postels and Ruprecht - (5000,p377) (5267,p240) (5284,p199) (5265,p46)
Dist: Alaska to southern Calif. (5267,p240) (5000,p377)
Coll: Ore: Coos Bay, Cape Arago (5265,p46) (5284,p199)
Hab: Growing on rocks between 1.0 and -1.5 foot tide levels. Also dredged from depths from 15-35 feet (5000,p377)
Tax: (5208,p246) (5178,p43)

Leptocladia conferta Setchell - (5000,p206)
Dist: Northern to central Calif. (5000,p206)
Hab: Growing on rocks between 1.0 and mean low tide levels (5000,p206)
Tax: (5184,p252); Phyc. Bor.-Amer. No. 1848
Str. & Repro: (5184,p250)

Lithophyllum decipiens (Foslie) Foslie - (5267,p152)
Dist: Northern British Columbia to Mexico (5267,p152)
Tax: (5193,p33) (5010,p358) (5041,p129) (5299,p338)

Lithophyllum lichenare Mason - (5267,p153)
Dist: Northern Washington
Tax: (5299,p339)

Lithophyllum neofarlowii Setchell and Mason - (5000,p228) (5267,p153)
Dist: Northern to central Calif. (5000,p228) (5267,p153)
Hab: Growing on rocks between mean low tide and -1.5 foot tide levels (5000,p228)
Tax: (5155,p95) (5010,p358 as *L. farlowii*) (5299,p341)

ALGAE - RHODOPHYTA

Lithophyllum whidbeyense Foslie - (5267,pl53)
Dist: Southern British Columbia to northern Washington (5267,pl53)
Tax: (5189,p21) (5193,p38) (5041,pl29) (5155,p96) (5299,p340)

Lithothamnion californicum Foslie - (5000,p221) (5267,pl49)
Dist: Washington to southern California (5000,p221) (5267,pl50)
Hab: Growing on rocks between 0.5 and -1.5 foot tide levels. Common everywhere (5000,p221)
Tax: (5195,p3) (5193); Phyc. Bor.-Amer. No. 61

Lithothamnion muricatum (Foslie) G. De Toni - (5267,pl50)
Dist: Southern British Columbia (5267,pl50)
Hab: Subtidal (5267,pl50)
Tax: (5013,pl29) (5193,p36)

Lithothamnion pacificum Foslie - (5000,p221) (5267,pl50)
Dist: Washington to central Calif. (5000,p221) (5267,pl50)
Hab: Growing on rocks between 0.5 and -1.5 foot tide levels. Common everywhere (5000,p221)
Tax: (5189,pl0) (5193)

Lithothamnium phymatodeum Foslie - (5267,pl50)
Dist: Northern Washington to Pacific Grove, Calif. (5267,pl51)
Hab: Subtidal (5267,pl51)
Tax: (5186,p3) (5193,p45,52,10,11) (5010,p358)

Lithothrix Aspergillum J. E. Gray - (5000,p231) (5267,pl57)
Dist: British Columbia to southern Calif. (5000,p231) (5267,pl57)
Hab: Growing on rocks at mean low tide level (5000,p231)
Tax: (5197,p33) (5105,p296) (5010,p359)
Str. & Repro: (5105,p295)

Lobocolax deformans Howe - (5000,p248) (5284,pl74)
Dist: Oregon coast to Monterey Peninsula (5000,p248) (5284,pl74)
Hab: Parasitic on Prionitis lanceolata and P. australis (5000,p248) (5284,pl74)
Tax: (5182,p91) (5178,pl3)
Str. & Repro: (5182,p90) (5178,pl3)

Lophosiphonia obscura (C. Agardh) Falkenberg - (5267,p234)
Dist: Southern British Columbia to northern Washington (5267,p234)
Tax: (5010,p329) (5041,pl22) (5094,p75)

Lophosiphonia villum (J. G. Agardh) Setchell and Gardner - (5000,p364) (5267,p234)
Dist: Southern British Columbia to Costa Rica (5267,p235)
Hab: Growing between 5.0 and 3.0 foot tide levels on cliffs or on vertical face of rocks more or less sheltered from direct sunlight (5000,p365)
Tax: (5010,p329) (5178,p40)
Str. & Repro: (5206,p294,475)

Melobesia marginata Setchell and Foslie - (5000,p219) (5267,p148) (5284,p169)
Dist: Washington to southern Calif. (5000,p220)
Coll: Oregon (5284,p169) (5267,p149)
Hab: Of frequent occurrence on Laurencia spectabilis, Rhodymenia, and larger species of Gelidium (5000,p220)
Tax: (5186,p10); Phyc. Bor.-Amer. No. 1300
Str. & Repro: (5110) as Lithothamnion

Melobesia mediocris (Foslie) Setchell and Mason - (5000,p219) (5284,p169) (5267,p149)
Dist: Oregon to central Calif. (5284,p169) (5267,p149) (5000,p219)
Hab: Epiphytic on Phyllospadix. Abundant wherever the host grows (5000,p219) (5284,p169)
Tax: (5155,p95)
Str. & Repro: (5110) as Lithothamnion

Membranoptera dimorpha Gardner - (5265,p43) (5284,p192) (5267,p218)
Dist: Queen Charlotte Is., British Columbia to Oregon (5267,p218)
Coll: Oregon: Coos Bay, Cape Arago (5265,p43) (5284,p192)
Tax: (5062,p211) (5010,p323) (5041,p119)

Membranoptera multiramosa Gardner - (5000,p337) (5284,p192)
Dist: Oregon to Moss Beach, Calif. (type loc.) (5284,p192) (5000,p337)
Hab: Growing between -0.5 and -1.5 foot tide levels on vertical face of sheltered rocks. Also found repeatedly at 1.0 foot tide level in tide pools (5000,p337)
Tax: (5062,p209)
Str. & Repro: (5118,p183)

Membranoptera platyphylla (Setchell and Gardner) Kylin - (5284,p192)
Dist: Southern British Columbia to Oregon (5267,p218) (5284,p192)
Tax: (5094,p64) (5010,p325)

Membranoptera tenuis Kylin - (5267,p219)
Dist: Northern Washington (5267,p219)
Tax: (5094,p64)

Membranoptera Weeksiae Setchell and Gardner - (5000,p337) (5267,p219)
Dist: Northern Washington to San Diego, Calif. (5267,p219)
Hab: Growing between mean low tide and -1.5 foot tide levels. Epiphytic on saxicolous. Epiphytic on Pterygophora californica and Desmarestia latifrons (5000,p338)
Tax: Setchell and Gardner (5062,p209)
Str.&Repro: (5118,p183)

Microcladia borealis Ruprecht - (5000,p330) (5265,p43) (5267,p213) (5284,p188)
Dist: Alaska to central Calif. (5267,p213) (5000,p331)
Coll: Alaska: Unalaska Island (type loc.) (5000,p331); Ore: Coos Bay, Cape Arago (5265,p43) (5284,p188)
Hab: Growing between 2.5 and 0.5 foot tide levels on vertical face of rocks more or less exposed to surf. Common everywhere and at times present in abundance (5000,p330)
Tax: (5024,p222) (5029,p67) (5178,p30); Phyc. Bor.-Amer. No. 48

Microcladia Coulteri Harvey - (5000,p329) (5284,p188) (5267,p214)
Dist: British Columbia to southern Calif. (5000,p330)
Coll: Oregon coast (5284,p188) (5267,p214)
Hab: Epiphytic on the larger membranous Florideae, especially Gigartina, Prionitis, and Grateloupia. Occasionally found on Laminariales. Abundant on hosts growing between 1.0 and -1.5 foot tide levels. Also found on Florideae dredged from a depth of 20-25 feet (5000,p330)
Tax: (5024,p222) (5029,p67) (5178,p30); Phyc. Bor.-Amer. No. 1448

Myriogramme pulchra Gardner - (5267,p223)
Dist: Northern Washington (5267,p223)
Tax: (5062,p206)

Myriogramme spectabilis (Eaton) Kylin - (5000,p346) (5267,p223)
Dist: Northern Washington to Redando, Calif. (5267,p223)
Hab: Dredged from depth of 20 feet and 70-90 feet (5000,p346)

Nemalion helminthoides (Velley) Batters - (5267,p139)
Nemalion lubricum Duby - (5000,p186)
Dist: Alaska to southern Calif. (5000,p187) (5267,p139)

ALGAE - RHODOPHYTA

Odonthalia oregona Doty - (5284,pl96)
Dist: Oregon coast (5284,pl96)

Odonthalia washingtoniensis Kylin - (5267,p245) (5265,p46) (5284,pl97)
Dist: Hope Is., British Columbia to Oregon (5267,p245)
Coll: Ore: Coos Bay, Cape Arago (5265,p46) (5284,pl97)
Hab: Low tide level and in larger tide pools (5265,p46)
Tax: (5094,p76) (5010,p336) (5094,pl22)

Opuntiella californica (Farlow) Kylin - (5000,p262) (5267,pl77) (5284,pl77) (5265,p37)
Dist: Alaska to southern Calif. (5267,pl77) (5000,p262)
Coll: Ore: Coos Bay, Cape Arago (5265,p37) (5284,pl77)
Hab: Isolated thalli have been found growing on rocks between mean low tide and -1.5 foot tide levels (5000,p262)
Tax: (5094,p23) (5178,pl8)
Str.&Repro: (5094,p23) (5095 as Callymenia)

Pachyarthron cretaceum (Postels and Ruprecht) Manza - (5267,pl55)
Dist: Unalaska, Alaska to northern Washington (5267,pl55)

Petrocelis franciscana Setchell and Gardner - (5000,p217) (5267,pl74) (5284,pl67)
Dist: Northern Washington to Mexico (5267,pl74)
Coll: Oregon (5284,pl67)
Hab: Growing on vertical face of rocks between 4.0 and 2.5 foot tide levels. Perennial but usually producing tetrasporangia only from December to February. Abundant on all rocky headlands (5000,p217)
Tax: (5028,p391) (5178,pl7)
Str.&Repro: (5176,pl74)

Petrocelis middendorffi (Ruprecht) Kjellman - (5267,pl74)
Dist: Bering Sea to northern Washington (5267,pl74)
Tax: (5010,p357) (5028,p391) (5094,p24)

Petroglossum pacificum Hollenberg - (5284,pl79)
Dist: Oregon coast (5284,pl79)
Tax: (5287,p573)

Peyssonnelia pacifica Kylin - (5000,p212) (5284,pl67) (5267,pl47)
Dist: Northern Washington to Mexico (5267,pl47)
Hab: On shells of turban snail (Tegula) at mean low tide level. Also dredged from depth from 20-25 feet and 30-35 feet (5000,p213)

Peyssonnelia pacifica Kylin - continued
Tax: (5094, p25) (5178, p8)
Str. &Repro: (5094, p25)

Phycodrys Setchellii Skottsberg - (5000, p342) (5284, p193)
Dist: Oregon to Baja California (5000, p343) (5284, p193)
Hab: Isolated thalli have been collected between mean low tide and -1.5 foot tide levels and also been dredged from a depth of 20-30 feet and 30-35 feet (5000, p342)
Tax: (5204, p433)

Pikea californica Harvey - (5000, p202) (5265, p35) (5267, p143)
Dist: British Columbia to southern Calif. (5000, p203)
Coll: Ore: Coos Bay, Cape Arago (5265, p35) (5267, p143)
Hab: Growing on rocks between mean low tide and -1.5 foot tide levels. Usually only isolated individuals at any station. Also dredged from a depth of 20-35 feet (5000, p203)
Tax: (5024, p222) (5029, p68) (5178, p8); Phyc. Bor.-Amer. No. 897

Pikea nootkana (Esper) Doty - (5284, p164)
Dist: Oregon coast (5284, p164)

Pikea pinnata Setchell - (5000, p202) (5284, p164) (5267, p143)
Dist: Oregon to central Calif. (5284, p164) (5267, p143) (5000, p202)
Hab: Growing on rocks between 0.5 and -1.5 foot tide levels. Usually only isolated individuals at any station. Also dredged from a depth of 30-35 feet and 35-40 feet (5000, p202)
Tax: Setchell in Phyc. Bor.-Amer. No. 648

Platysiphonia clevelandi (Farlow) Papenfuss - (5267, p220)
Dist: Northern Washington to San Diego, Calif. (5267, p221)
Tax: (5080, p534)

Platythamnion heteromorphum J. G. Agardh - (5000, p315) (5284, p191)
Dist: Oregon to southern Calif. (5284, p191)
Hab: Dredged from a depth of 30-35 feet (5000, p315)
Tax: (5094, p51)
Str. &Repro: (5094, p51)

Platythamnion pectinatum Kylin - (5000, p316) (5267, p205) (5265, p41) (5284, p191)
Dist: Puget Sound to southern Calif. (5267, p205) (5000, p317)
Coll: Ore: Coos Bay, Cape Arago (5265, p41) (5284, p191)
Hab: Growing between mean low tide and -1.0 foot tide levels. On *Polyneura latissima* and also on rocks dredged from a depth of 30-35 feet (5000, p316)
Tax: (5094, p53) (5178, p28)
Str. &Repro: (5094, p51)

ALGAE - RHODOPHYTA

Platythamnion reversum (Setchell and Gardner) Kylin - (5265,p41) (5267,p205)
Platythamnion heteromorphum f. *reversum* Setchell and Gardner - (5010,p345)
Dist: Northern Washington to Oregon (5267,p205)
Coll: Ore: Charleston, Coos Bay, Cape Arago (5265,p41)
Tax: (5094,p54)

Platythamnion villosum Kylin - (5000,p315) (5265,p315) (5284,p191) (5267,p206)
Dist: Sitka, Alaska to Monterey Peninsula (5000,p316) (5265,p41)
Coll: Ore: Coos Bay, Cape Arago (5265,p41) (5284,p191)
Hab: Growing between mean low tide and -1.5 foot tide levels. Also dredged from a depth of 25-30 feet and 30-35 feet (5000,p316)
Tax: (5094,p51)
Str. & Repro: (5094,p51)

Pleonosporium abysicola Gardner - (5267,p208)
Dist: Northern Washington (5267,p208)
Hab: Epiphytic on *Ceramium* (5267,p208)
Tax: (5065,p380)

Pleonosporium squarrosum var. *obovatum* Gardner - (5267,p209)
Dist: Southern British Columbia (5267,p209)
Tax: (5066,p414)

Pleonosporium squarrosum var. *squarrosum* Kylin - (5267,p209)
Dist: Southern British Columbia to northern Washington (5267,p209)
Tax: (5094,p57 as *P. squarrosum*)

Pleonosporium vancouverianum J. G. Agardh - (5000,p321) (5267,p209)
Dist: Vancouver Island to Monterey Peninsula (5000,p321) (5267,p209)
Hab: Dredged from a depth of 30-35 feet. Found both on rocks and on tube worms (5000,p321)
Tax: (5094,p57)
Str. & Repro: (5094,p56)

Plocamiocolax pulvinata Setchell - (5000,p265) (5284,p178) (5267,p181)
Dist: Washington to southern Calif. (5000,p265)
Coll: Ore: (5284,p178) (5267,p181)
Hab: Parasitic on *Plocamium pacificum* (5000,p265)
Tax: (5141,p396)
Str. & Repro: (5141,p395)

ALGAE - RHODOPHYTA

Plocamium oregonum Doty - (5284,p177) (5267,p179)
Dist: Southern British Columbia to central Calif. (5267,p179) (5284,p177)

Plocamium pacificum Kylin - (5000,p264) (5284,p178) (5267,p179)
Dist: British Columbia to southern Calif. (5267,p179) (5000,p264)
Coll: Oregon (5284,p178) (5265,p39)
Hab: Growing on rocks between mean low tide and -1.5 foot tide levels. Often on rocks buried in sand. Occasionally epiphytic on other algae. Epiphytic on Nereocystis (5000,p264) (5265,p39)
Tax: (5094,p42) (5178,p20)

Plocamium tenue Kylin - (5284,p178) (5267,p180)
Dist: Sitka, Alaska to Oregon (5284,p178) (5267,p180)
Tax: (5094,p43)

Plocamium violaceum Farlow - (5000,p264) (5265,p40) (5284,p178) (5267,p180)
Dist: British Columbia to southern Calif. (5000,p265)
Coll: Ore: Coos Bay, Cape Arago (5265,p40) (5267,p180)
Hab: Growing between 2.5 and 0.5 foot tide levels on vertical face of rocks exposed to heavy surf. Frequently found in abundance (5000,p264)
Tax: (5052,p240) (5024,p224) (5029,p68) (5178,p20); Phyc. Bor. - Amer. No. 542

Plumaria californica (Ruprecht ex Harvey) Doty - (5284,p189)
Ptilota californica Ruprecht - (5000,p332) (5267,p215) (5265,p42)
Dist: Northern British Columbia to San Diego, Calif. (5267,p215)
Coll: Ore: Coos Bay, Cape Arago (5265,p42) (5000,p333) (5284,p189)
Hab: Growing in lower littoral (5000,p332)
Str. & Repro: (5042) (5117,p361)

Plumaria filicina (Farlow) Doty - (5284,p188) (5265,p42)
Ptilota filicina (Farlow) J. G. Agardh - (5000,p333) (5267,p215) (5284,p188)
Dist: Alaska to central Calif. (5000,p333) (5265,p42)
Coll: Oregon (5284,p188) (5267,p216)
Hab: Isolated thalli have been collected between the mean low tide and -1.5 foot tide levels (5000,p333)
Tax: (5024,p222); Phyc. Bor. -Amer. No. 643
Str. & Repro: (5042) (5117,p361)

ALGAE - RHODOPHYTA

Plumaria hypnoides (Harvey) Doty - (5284,p189)
Ptilota hypnoides Harvey - (5000,p332) (5267,p216) (5265,p43)
Dist: Alaska to central Calif. (5000,p332) (5267,p216)
Coll: Ore: (5284,p189), Coos Bay, Cape Arago (5265,p43)
Hab: Isolated stunted thalli 6-8 cm tall have been found on articulated corallines. Well developed thalli 15 cm or more tall are frequently cast ashore in abundance (5000,p332)
Tax: (5024,p222) (5029,p67) (5178,p28); Phyc. Bor.-Amer. No. 599
Str. &Repro: (5042) (5117,p361)

Plumaria tenius (Kylin) Doty - (5284,p188) (5267,p217)
Dist: Northern British Columbia to northern Wash. (5267,p217) (5284,p188)
Tax: (5094,p217)

Polycoryne Gardneri Setchell - (5000,p347) (5267,p222)
Dist: Northern Washington to Pebble Beach, Calif. (5267,p223)
Hab: Parasitic on Nienburgia Andersoniana (5000,p347)
Tax: (5141,p395)

Polyporolithon conchatum (Setchell and Foslie) Mason - (5267,p151)
Lithothamnion conchatum Setchell and Foslie - (5000,p222)
Dist: Washington to central Calif. (5000,p223) (5267,p151)
Hab: Epiphytic on articulated Corallinaceae, especially Calliarthron. Common everywhere (5000,p223)
Tax: (5186,p6) (5191,p13) (5193); Phyc. Bor.-Amer. No. 1750; (5299,p317) (5189,p6)

Polyporolithon parcum (Setchell and Foslie) Mason - (5267,p151)
Lithothamnion parcum Setchell and Foslie - (5000,p223)
Dist: Washington to central Calif. (5000,p223) (5267,p151)
Hab: Epiphytic on articulated Corallinaceae, especially Calliarthron. Common everywhere (5000,p223)
Tax: Setchell and Foslie (5191,p14) (5193); Phyc. Bor.-Amer. No. 1749; (5299,p318)

Polyneura latissima (Harvey) Kylin - (5000,p341) (5267,p221) (5265,p43) (5284,p193)
Dist: British Columbia to Baja Calif. (5000,p341)
Coll: Ore: Coos Bay, Cape Arago (5265,p43) (5284,p193) (5267,p221)
Hab: Growing between mean low tide and -1.5 foot tide levels on vertical face of rocks somewhat sheltered from full force of surf. Abundant in favorable habitats. Also dredged from a depth of 30-35 feet and from 12-15 feet (5000,p341)
Tax: (5178,p31) (5010,p320) (5041,p119)

Polyporolithon reclinatum (Foslie) Mason - (5267,p151)
Dist: Southern British Columbia to La Jolla, Calif. (5267,p152)
Hab: Epiphytic on Bossiella and Corallina
Tax: (5041,p129) (5193,p45,54) (5299,p319)

Polysiphonia Collinsii Hollenberg var. *collinsii* - (5267,p229)
Polysiphonia Collinsii Hollenberg mss. - (5000,p363) (5284,p197) (5265,p44)
Dist: British Columbia to southern Calif. (5000,p364)
Coll: Ore: Coos Bay, Cape Arago (5265,p44) (5284,p197) (5267,p229)
Hab: Growing on rocks or on coralline algae in the mid-littoral zone (5000,p364)
Tax: *Polysiphonia Sancti-Petri* Collins in Phyc. Bor.-Amer. No. 2247 (name only)

Polysiphonia collinsii var. *deliquescens* Hollenberg - (5267,p229)
Dist: Prince William Sound, Alaska, to northern Wash. (5267,p229)

Polysiphonia collinsii var. *luxurians* Hollenberg - (5267,p230)
Dist: Northern Washington (5267,p230)

Polysiphonia Hendryi Gardner - (5000,p363) (5265,p45) (5284,p198)
Dist: Oregon to Baja Calif. (5284,p198) (5000,p363)
Coll: Ore: Coos Bay, Cape Arago (5265,p45)
Hab: Epiphytic on various algae growing between 3.5 and 1.5 foot tide levels (5000,p363)
Tax: (5067,p101)

Polysiphonia macounii Hollenberg - (5267,p230)
Dist: Southern British Columbia (5267,p230)
Tax: (5041,p120) (5298,p100) (5081,p780)

Polysiphonia pacifica var. *determinata* Hollenberg - (5267,p230)
Dist: Alaska to central Calif. (5267,p230)
Tax: (5081,p778)

Polysiphonia pacifica var. *distans* Hollenberg - (5267,p230)
Dist: Southern British Columbia to Santa Cruz, Calif. (5267,p231)
Tax: (5081,p779)

Polysiphonia pacifica var. *disticha* Hollenberg - (5267,p231)
Dist: Southern British Columbia to central Calif. (5267,p231)
Tax: (5081,p778)

Polysiphonia pacifica var. *gracilis* Hollenberg - (5267,p231)
Dist: Southern British Columbia to central Calif. (5267,p231)
Tax: (5081,p778)

Polysiphonia pacifica Hollenberg var. *pacifica* - (5267,p231) (5000,p359) (5265,p45) (5284,p198)
Dist: Sitka, Alaska to Mexico (5267,p232)
Coll: Ore: Coos Bay, Cape Arago (5265,p45) (5284,p198)
Hab: Growing on rocks between 2.0 and -1.0 foot tide levels (5000,p360)
Tax: (5081,p777)

Polysiphonia paniculata Montagne - (5284,p197) (5267,p232) (5265,p44)
Polysiphonia californica Harvey - (5000,p362)
Dist: British Columbia to Baja Calif. (5000,p363)
Coll: Ore: Coos Bay, Cape Arago (5265,p44) (5284,p197)(5267,p232)
Hab: Growing on rocks between 1.0 and -1.5 foot tide levels. Also dredged from a depth of 20-25 feet (5000,p362)
Tax: (5024,p224) (5178,p36); Phyc. Bor. -Amer. No. 1142

Polysiphonia senticulosa Harvey - (5267,p233)
Dist: Southern British Columbia to Monterey, Calif. (5267,p233)
Tax: (5010,p327) (5041,p119) (5094,p71) (5178,p35)

Polysiphonia Snyderae Kylin - (5284,p198)
Dist: Oregon coast (5284,p198)
Tax: (5178,p35) (5081,p781); Collins *et al.*, 1899, Phyc. Bor. - Amer. fasc. 13:638

Polysiphonia snyderae var. *heteromorpha* Hollenberg - (5267,p233)
Dist: Southern British Columbia to northern Washington (5267,p233)
Tax: (5081,p784)

Polysiphonia snyderae var. *snyderae* Kylin - (5267,p233)
Dist: Southern British Columbia to Mexico (5267,p233)
Tax: (5178,p35) (5081,p784)

Polysiphonia urceolata f. *urceolata* (Dillwyn) Greville - (5267,p234)
Dist: Alaska to northern Washington (5267,p234)
Tax: (5010,p326) (5041,p119) (5094,p71) (5298,p100) (5081,p774)

Porphyra abyssicola Kjellman - (5267,p127)
Dist: Southern British Columbia to northern Washington (5267,p127)
Hab: Epiphytic on *Zostera* (5267,p127)
Tax: (5084,p223) (5010,p291) (5041,p112) (5094,p8)

Porphyra amplissima (Kjellman) Setchell and Hus - (5083,p67) (5267,pl27)
Dist: Amaknak I., Alaska to northern Wash. (5267,pl28)
Hab: Upper subtidal (5267,pl28)
Tax: (5083,p67) (5084,p218) (5010,p290) (5041,pl12) (5094,p8)

Porphyropsis coccinea (J. Agardh) Rosenvinge - (5267,pl33)
Dist: Northern Washington (5267,pl33)
Hab: On subtidal worm tubes to 5-10 fathoms (5267,pl33)
Tax: (5176,p69) (5094,p9)

Porphyrella Gardneri Smith and Hollenberg - (5000,pl75) (5267,pl32) (5284,pl61) (5265,p34)
Dist: From Cape Arago, Oregon to Monterey Peninsula, Calif. (5000,pl75) (5267,pl32)
Hab: Epiphytic on lateral margins of blades of *Laminaria Andersonii* and on the tips of leaflets of *Egregia Menziesii* (5000,pl75) (5265,p34)
Tax: (5158,p215)
Str. &Repro: (5158,p215)

Porphyra lanceolata (Setchell and Hus) G. M. Smith - (5000,pl70) (5267,pl28) (5284,pl60)
Dist: Washington to central Calif. (5000,pl70)
Coll: Wash: Chehalis Bay (5000,pl70); Ore: (5284,pl60) (5267,pl28)
Hab: Growing on rocks between 4.0 and 2.5 foot tide levels. Appearing early in winter and persisting until late in summer (5000,pl70)
Tax: (5158,p213)
Str. &Repro: (5170,p302)

Porphyra miniata forma *cuneiformis* Setchell and Hus - (5000,pl74) (5267,pl28) (5265,p34) (5284,pl61)
Dist: Alaska to Monterey Peninsula (5000,pl75)
Coll: Ore: Coos Bay, Cape Arago (5265,p34) (5284,pl61)
Hab: Found cast ashore and from stomach of common fish (*Aspocotus bison*) (5265,p34) (5000,pl75)
Tax: (5083,p68) (5084,p218); Phyc. Bor.-Amer. No. 929
Str. &Repro: (5170,p302)

Porphyra naiadum Anderson - (5000,pl69) (5265,p34) (5267,pl29) (5284,pl60)
Dist: British Columbia to southern Calif. (5000,pl69)
Coll: Ore: Coos Bay, Cape Arago (5265,p34) (5284,pl60) (5267,pl29)
Hab: Epiphytic on leaves of Phyllospadix. Plants annual: appearing early in spring and disappearing late in autumn. Abundant wherever host is present (5000,pl69). Epiphytic on leaves of Zostera (5265,p34)
Tax: (5029,p67) (5084,p212) (5178,p4); Phyc. Bor.-Amer. No. 632
Str. & Repro: (5170,p302)

Porphyra Nereocystis Anderson - (5000,pl71) (5265,p34) (5284,pl60) (5267,pl29)
Dist: Alaska to southern Calif. (5000,pl71) (5267,pl30)
Coll: Oregon (5284,pl60) (5265,p34)
Hab: Epiphytic on stipes of Nereocystis Luetkeana and usually restricted to portion 3-6 m below the pneumatocyst. Thalli annual and generally found only from November to June. At times present in abundance on host plants cast ashore (5000,pl71)
Tax: (5024,p221 name only) (5029,p67) (5083,p65) (5084,p210); Phyc. Bor.-Amer. No. 583
Str. & Repro: (5170,p302)

Porphyra occidentalis Setchell and Hus - (5284,pl61) (5265,p34) (5000,pl74)
Dist: Central Oregon to central Calif. (5000,pl74) (5265,p34)
Coll: Ore: Coos Bay, Cape Arago (5265,p34) (5284,pl61)
Hab: Growing on rocks between 0.5 and -1.5 foot tide levels. Also found on stipes of Pterygophora californica cast ashore.
Tax: (5083,p69) (5084,p228)
Str. & Repro: (5170,p302)

Porphyra perforata J. G. Agardh - (5000,pl72) (5265,p33) (5267,pl31) (5284,pl61)
Dist: Alaska to southern Calif. (5267,pl31) (5000,pl72)
Coll: Ore: Coos Bay, Cape Arago (5265,p33) (5284,pl61)
Hab: Common everywhere on rocks between 3.5 and 2.0 foot tide levels; at times epiphytic on other algae (5000,pl72)
Tax: (5083,p63) (5084,p202) (5178,p4); Phyc.-Bor.-Amer. No. 682
Str. & Repro: (5170,p302)

ALGAE - RHODOPHYTA

Porphyra schizophylla Hollenberg - (5000,pl73) (5284,pl60)
Dist: Oregon to central Calif. (5284,pl60) (5000,pl73)
Hab: Growing near high tide level on rocks swept by heavy surf (5000,pl73)
Tax: (5158,p213)
Str. & Repro: (5170,p302)

Porphyra Thuretii Setchell and Dawson mss. - (5000,pl71) (5284,pl61)
Dist: Oregon to Mexico (5000,pl72) (5284,pl61)
Hab: On rocks at the 1.0 foot tide level; also epiphytic on Gracilaria sjoestedtii (5000,pl72)
Tax: (5083,pl63) (5084,pl99)
Str. & Repro: (5170,p302)

Porphyra umbilicalis (Setchell and Gardner) Collins - (5267,pl31)
Dist: St. Paul Is., Alaska, to southern British Columbia (5267,pl31)
Hab: Intertidal (5267,pl31)
Tax: (5010,p289 as P. laciniata f. umbilicalis) (5041,pl12)
Poll. Studies: (2475,p341)

Porphyra variegata Kjellman - (5000,pl73) (5284,pl61)
Dist: From Puget Sound to Monterey Peninsula (5000,pl74) (5267,pl32)
Hab: Known only from specimens cast ashore (5000,pl74); subtidal (5265,p34) (5267,pl32)
Tax: Kjellman ex. (5083,p69) (5084,p225); Phyc. Bor.-Amer. No. 930; (5010,p291) (5041,pl12) (5094,p8)
Str. & Repro: (5170,p302)

Prionitis Andersonii Eaton - (5000,p246) (5265,p36)
Zanardinula Andersoniana (J. Agardh) Papenfuss - (5286,p342)
Dist: Central Oregon to central Calif. (5000,p246) (5265,p36)
Coll: Ore: Coos Bay, Cape Arago (5265,p36)
Hab: Growing between 1.0 and -1.5 foot tide levels on sand covered rocks in sheltered coves (5000,p246)
Tax: Eaton in (5050,p372) name only; (5024,p222) (5029,p68) (5178,pl1); Algae Amer.-Bor. Exsicc. No. 24
Str. & Repro: (5183,pl9)

Prionitis filiformis Kylin - (5000,p244)
Zanardinula filiformis (Kylin) Papenfuss - (5286,p342)
Dist: Southern Oregon to central Calif. (5000,p244)
Coll: Ore: Cape Arago (5000,p244)

Prionitis filiformis Kylin - continued
Hab: Growing on rocks between 0.5 and -1.0 foot tide levels (5000,p244)
Tax: (5178,pl3)
Str. & Repro: (5183,pl9)

Prionitis lanceolata Harvey - (5000,p246) (5265,p36) (5267,pl64)
Zanardinula lanceolata (Harvey) De Toni
Dist: British Columbia to southern Calif. (5000,p246)
Coll: Ore: Coos Bay, Cape Arago (5265,p36) (5267,pl65)
Hab: Common everywhere on rocks between 1.0 and -1.5 foot tide levels. Also dredged from a depth of 40-60 feet and from 20-25 feet (5000,p246)
Tax: (5024,p222) (5029,p68) (5183,pl9) (5178,pl2); Phyc. Bor.-Amer. No. 199A
Str. & Repro: (5183,pl9)

Prionitis linearis Kylin - (5000,p245)
Zarnardinula Kylinii Doty - (5284,pl73)
Dist: Central to southern Calif. (5000,p245)
Hab: Growing on rocks between mean low tide and -1.0 foot tide levels (5000,p245)
Tax: (5178,pl2)
Str. & Repro: (5183,pl9)

Prionitis Lyallii Harvey - (5000,p247) (5265,p36) (5267,pl65)
Zanardinula Lyallii (Harvey) De Toni
Dist: British Columbia to Mexico (5000,p247) (5267,pl66)
Coll: Ore: Coos Bay, Cape Arago (5265,p36)
Hab: Growing between mean low tide and -1.0 foot tide levels on rocks exposed to heavy surf (5000,p247)
Tax: (5072,pl73) (5010,p350) (5094,pl9)
Str. & Repro: (5183,pl9)

Pterochondria Woodii (Harvey) Hollenberg - (5000,p368) (5267,p237) (5284,pl99) (5265,p45)
Dist: British Columbia to southern Calif. (5000,p368)
Coll: Ore: Coos Bay, Cape Arago (5265,p45) (5284,pl99)
Hab: Regularly epiphytic on *Cystoseira osmundacea*; occasionally developing on Laminariales or on foliose Florideae. Found locally wherever *Cystoseira* grows but present in abundance only during the summer and early autumn (5000,p368)(5265,p45)
Tax: (5080,p533) (5010,p329) (5041,pl21) (5094,p72)
Str. & Repro: (5080,p533)

ALGAE - RHODOPHYTA

Pterosiphonia arctica Setchell and Gardner - (5267,p235)
Dist: Alaska to northern Washington (5267,p235)
Tax: (5010,p329) (5094,p72)

Pterosiphonia Baileyi (Harvey) Falkenberg - (5000,p367)
Dist: Northern to southern Calif. (5000,p367)
Coll: Crescent City (5000,p367)
Hab: Growing on vertical face of rocks between 0.5 and -1.0 foot tide levels. Never present in abundance. Also dredged from a depth of 20-25 feet (5000,p367)
Tax: (5178,p38)
Str.&Repro: (5207)

Pterosiphonia bipinnata var. bipinnata (Postels and Ruprecht) Falkenberg - (5267,p235) (5000,p366) (5284,p198) (5265,p45)
Dist: Alaska to southern Calif. (5000,p366)
Coll: Ore: Coos Bay, Cape Arago (5265,p45) (5284,p198)
Hab: Growing on rocks at mean low tide level (5000,p366)
Tax: (5178,p39); Phyc. Bor.-Amer. Nos. 1145,1698
Str.&Repro: (5207)

Pterosiphonia bipinnata var. robusta (Gardner) Doty - (5284,p198) (5267,p236)
Dist: Southern British Columbia to San Francisco, Calif. (5267,p236)
Tax: (5067,p102)

Pterosiphonia dendroidea (Montagne) Falkenberg - (5000,p366) (5284,p198) (5267,p236) (5265,p45)
Dist: British Columbia to southern Calif., Peru (5000,p366)
Coll: Ore: Coos Bay, Cape Arago (5265,p45) (5284,p198) (5267,p236)
Hab: Growing on rocks between mean low tide and -1.5 foot tide levels. Especially abundant in crevices and on sheltered parts of rocks. Also dredged from a depth of 20-25 feet (5000,p366)
Tax: (5178, p39)
Str.&Repro: (5207)

Pterosiphonia gracilis Kylin - (5267,p237) (5265,p45) (5284,p198)
Dist: Southern British Columbia to Oregon (5267,p237)
Coll: Ore: Tunnel Pt., at south end of Bassendorf Beach; South Bay (5265,p45); Coos Bay, Cape Arago (5265,p45) (5284,p198)
Tax: (5094,p72) (5041,p73) (5298,p100)

Ptilota asplenioides (Esper) C. Agardh - (5267,p215)
Dist: Yakutat B., Alaska to northern Wash. (5267,p215)
Tax: (5010,p339)

Ptilota pectinata (Gunner) Kjellman - (5267,p217)
Dist: Bering Sea to northern Washington (5267,p217)
Tax: (5010,p341) (5094,p60)

Pugetia fragilissima Kylin - (5265,p36) (5267,pl67)
Dist: Southern British Columbia to Monterey, Calif. (5267,pl67)
Coll: Ore: Coos Bay, Cape Arago (5265,p36)
Hab: Growing on vertical rocks from minus one to minus one and one half feet levels. Cystocarpic plants in July
Tax: (5094,p31)

Rhodochorton penicilliforme (Kjellman) Rosenvinge - (5267,pl37)
Dist: Spruce I., Alaska to northern Washington (5267,pl37)
Hab: Epiphytic on algae and worm tubes to 5-10 fathoms (5267,pl37)
Tax: (5010,p394 as Chantransia secundata) (5014,p45) (5179,pl76) (5285,p327)

Rhodochorton subimmersum Setchell and Gardner - (5000,pl85)
Acrochaetium subimmersum (Setchell and Gardner) Papenfuss - (5267,pl35)
Dist: Puget Sound to central Calif. (5000,pl85)
Hab: Forming conspicuous red patches on Grateloupia californica (5000,pl85)
Tax: (5010,p347) (5179,pl91); Phyc. Bor.-Amer. No. 1348; (5285,p318)
Str. & Repro: (5179)(5046) (5176,pl34)

Rhodochorton Rothii (Turton) Nägeli - (5000,pl82)
Rhodochorton purpureum (Lightfoot) Rosenvinge - (5284,pl62) (5265,p34) (5267,pl37)
Dist: Alaska to southern Calif. (5000,pl83)
Coll: Ore: Coos Bay, Cape Arago (5265,p34) (5267,pl37)
Hab: Growing at extreme high tide level in caves and on underside of ledges (5000,pl83)
Tax: (5179,pl77); Phyc. Bor.-Amer. No. 56
Str. & Repro: (5179) (5046) (5176,pl34)

Rhodochorton tenue Kylin - (5267,pl38)
Dist: Northern Washington to Santa Cruz, Calif. (5267,pl38)
Tax: (5094,p44) (5179,pl77) (5285,p328)

ALGAE - RHODOPHYTA

Rhododermis Georgii (Batters) Collins - (5284,p167)
Dist: Oregon coast (5284,p167)
Tax: (5040,p106)

Rhodoglossum affine (Harvey) Kylin - (5000,p287) (5267,p189) (5284,p181) (5265,p40)
Dist: Oregon to southern Calif. (5000,p287) (5267,p189)
Coll: Ore: (5284,p181); Coos Bay, Cape Arago (5265,p40) (5267,p189)
Hab: Growing on vertical face of rocks between 2.0 foot and mean low tide levels (5000,p287)
Tax: (5178,p24)

Rhodoglossum latissimum J. Agardh - (5267,p189)
Dist: Northern British Columbia (5267,p189)
Tax: (5010,p300) (5094,p28)

Rhodomela larix (Turner) C. A. Agardh - (5000,p374) (5267,p241) (5284,p196) (5265,p45)
Dist: Alaska to central Calif. (5000,p375)
Coll: Ore: Coos Bay, Cape Arago (5265,p45) (5284,p196) (5267,p241)
Hab: Growing on rocks between 2.0 and 0.5 foot tide levels (5000,p375)
Tax: (5024,p224) (5029,p68); Phyc. Bor.-Amer. Nos. 241, 1699

Rhodomela lycopodioides (Linnaeus) C. Agardh - (5267,p242)
Dist: Alaska to northern Washington (5267,p242)
Tax: (5010,p332) (5041,p122)

Rhodymenia californica Kylin - (5000,p300) (5265) (5284,p185) (5267,p195)
Dist: Oregon to southern Calif. (5000,p301) (5267,p195)
Coll: Oregon (5284,p185)
Hab: Growing on vertical face of sheltered rocks between mean low tide and -1.5 foot tide levels. Also dredged from a depth of 20-25 feet (5000,p301)
Tax: (5178,p27) (5202,p135)
Str. & Repro: (5183,p30)

Rhodymenia pacifica Kylin - (5000,p301) (5267,p196) (5265,p40) (5284,p185)
Dist: Northern British Columbia to San Diego, Calif. (5267,p196)
Coll: Ore: Coos Bay, Cape Arago (5265,p40) (5284,p185)
Hab: Growing on vertical face of rocks between mean low tide and -1.5 foot tide levels. Also dredged from a depth of 15-20 feet and 60-75 feet (5000,p301)

Rhodymenia pacifica Kylin - continued
Tax: (5178,p27) (5202,p142)
Str. & Repro: (5183,p30)

Rhodymenia palmata var. mollis Setchell and Gardner - (5000,p301) (5284,p185) (5265,p40) (5267,p196)
Dist: Agattu Island, Alaska to Pacific Grove, Calif. (5000,p302) (5267,p196)
Coll: Ore: Coos Bay, Cape Arago (5265,p40) (5284,p185)
Hab: On rocks in a tide pool at mean low tide level. Fifteen feet below pneumatocyst of a thallus of Nereocystis Luetkeana (5000,p302)
Tax: (5010,p315); Phyc. Bor.-Amer. No. 934
Str. & Repro: (5183,p30)

Rhodymenia palmata (Linnaeus) Greville f. palmata - (5267,p197)
Dist: Aleutian Island, Alaska to northern Washington (5267,p197)
Tax: (5010,p314) (5041,p117) (5094,p41) (5298,p100)

Rhodymenia pertusa (Postels and Ruprecht) J. Agardh - (5267,p197) (5265,p40) (5284,p185)
Dist: Alaska to Oregon (5267,p198)
Coll: Ore: Coos Bay, Cape Arago, Squaw Island (5265,p40) (5284,p185)
Hab: Cystocarpic and tetrasporic plants both have been found in abundance two alternate years. These plants were suspended from an overhanging rock ledge along the outer part of the island reef, where the plants were growing at a minus tide level.
Tax: (5010,p313) (5041,p118) (5094,p41) (5298,p100)

Rhodymenia stipitata Kylin - (5267,p198)
Dist: British Columbia to northern Washington (5267,p198)
Tax: (5094,p41)

Rhodymeniocolax botryoidea Setchell - (5267,p199)
Dist: Northern Washington to San Diego, Calif. (5267,p199)
Hab: Parasitic on Rhodymenia pertusa (5267,p199)
Tax: (5141,p394)

Sarcodiotheca furcata (Setchell and Gardner) Kylin - (5267,p177)
Dist: Southern British Columbia to northern Washington (5267,p177)
Tax: (5010,p310) (5041,p117) (5094,p36)

Schizymenia pacifica Kylin - (5000,p258) (5265,p37) (5284,p176) (5267,p174)
Dist: Unga I., Alaska to Mexico (5267,p175)
Coll: Ore: Coos Bay, Cape Arago (5265,p37) (5284,p176)
Hab: Growing between mean low tide and -1.5 foot tide levels on top of rocks exposed to surf. Also dredged from a depth of 30-35 feet (5000,p258)
Tax: (5178,p17)
Str. & Repro: (5094,p21)

Serraticarolia macmillani (Yendo) Silva - (5267,p155)
Dist: Southern British Columbia to Monterey Peninsula (5267,p155)

Stenogramma californica Harvey - (5000,p276) (5267,p184) (5265,p39) (5284,p180)
Dist: Puget Sound to southern Calif. (5000,p276)
Coll: Ore: Coos Bay, Cape Arago (5265,p39) (5267,p184)
Hab: Growing between 0.5 and -1.0 foot tide levels and either on rocks or in sand between rocks. Usually found only during spring and early summer. Also dredged from 30-55 feet, and 20-25 feet (5000,p276)
Tax: (5094,p30)
Str. & Repro: (5199)

Thuretellopsis peggiana Kylin - (5267,p143)
Dist: Northern Washington (5267,p143)
Hab: Subtidal to 10 fathoms (5267,p143)
Tax: (5094,p13)

Trailliella intricata Batters - (5267,p200)
Dist: Northern Washington to Mexico (5267,p200)
Tax: (5094,p44)

Turnerella mertensiana (Postels and Ruprecht) Schmitz - (5267,p175)
Dist: Shumagin Is., Alaska to northern Washington (5267,p175)
Tax: (5010,p309) (5041,p117)

Weeksia fryeana Setchell - (5267,p145)
Dist: Northern Washington (5267,p145)
Tax: (5094,p15)

Whidbeyella cartilaginea Setchell and Gardner - (5267,p140)
Dist: Northern Washington (5267,p140)
Hab: Subtidal (5267,p140)
Tax: (5010,p295) (5094,p12)

ANGIOSPERMAE

Division: ANGIOSPERMAE

Phyllospadix scouleri Hook
Dist: Alaska to Calif. (5301); B. C. to Calif. (2006)
Hab: On submerged rocks along coast of Vancouver Is. to Calif. (3419,p73)

Phyllospadix torreyi Wats
Dist: California (2006)
Hab: On rocks along coast (3419,p73)

Zostera marina Linnaeus
Dist: Washington to Calif. (2006)
Hab: In bays and along coasts (3419) (5301)

Zostera marina var. latifolia Marong
Dist: Alaska to Calif. (2006)

PHYLUM PROTOZOA

The Protozoans have not been well studied in our study area. The only group that seems to be well reviewed is the Foraminifera which is covered by several publications (2399,2542,2547,2549). There are no general reviews of the literature for other groups from the study area but rather extensive studies to the north and south. Those to the north have been included (2555,2556,2557,2661,2681,2682,2683) but those to the south have not. Time has not permitted us to study the many papers by Kofoid and his associates to the south, nor have we searched for isolated descriptions from the study area. The class Sporozoa has been completely omitted.

Class: SARCODINA
Order: Lobosa
Suborder: Amoebaea

Metachaos fulvum Schaeffer - (2555,p3)
Coll: B. C.: Departure Bay, False Narrows (2555,p3)
Hab: Among algae (2555,p3)

Striolatus tardus Schaeffer - (2555,p4)
Coll: B. C.: Cortes Island, Departure Bay (2555,p4)
Hab: Among algae on the beaches (2555,p4)

PROTOZOA - SARCODINA - Amoebaea

Trichamoeba gumia Schaeffer - (2555,p3)
Coll: B. C.: Departure Bay (2555,p3)
Hab: On Zostera and algae (2555,p3)

Vexillifera vacillans Wailes - (2555,p4)
Coll: B. C.: Nanaimo district (2555,p4)
Hab: In cultures of algae (2555,p4)

Suborder - Conchulina

Cyphoderia ampulla (Ehrenb.) - (2555,p5)
Coll: B. C.: Strait of Georgia on or near the shore (2555,p5)

Cyphoderia ampulla f. laevis Wailes - (2555,p5)
Coll: B. C.: Off Cortes Island, Strait of Georgia, rare (2555,p5)

Cyphoderia ampulla var. vitraea Wailes - (2555,p5)
Coll: B. C.: Camp Island, Strait of Georgia (2555,p5)
Hab: Among algae on the beach, rare (2555,p5)

Euglypha ciliata (Ehrenb.) - (2555,p4)
Coll: B. C.: Strait of Georgia, near the shore and in brackish water (2555,p4)

Euglypha laevis (Ehrenb.) - (2555,p5)
Coll: B. C.: Strait of Georgia, near the shore (2555,p5)

Order: Reticulosa
Suborder: Foraminifera

Adercotryma glomerata - (2547)
Coll: Oregon (2547)

Allogromia ovoidea Rhumbler - (2555,p6)
Coll: B. C.: Departure Bay, on float (2555,p6)
Hab: Among algae, etc. (2555,p6)

Alveolophragmium advenum - (2399,p68)
Dist: Juan de Fuca, Wash. to Pt. Conception, Calif. (2399,p68)
Hab: Sand, >100' (2399,p68)

PROTOZOA - SARCODINA - Foraminifera

Alveolophragmium columbiensis - (2399,p68)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p68)
Hab: Rock and sand; 0->100' (2399,p68)

Ammobaculites exiguus - (2547)
Coll: Oregon (2547)

Ammodiscus minutissimus - (2547) (2549)
Coll: Oregon (2547); 50-100 m (2549,p36)

Ammonia beccarii - (2547)
Coll: Oregon (2547)

Ammotium salsum - (2547)
Coll: Oregon (2547)

Angulogerina angulosa group - (2399,p68)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p68)
Hab: Sand and rock; 0->100' (2399,p68)

Asterellina puchella (Parker, 1952) - (2547)
Coll: Oregon (2547)

Astrononion gallowayi Loeblich and Tappan, 1953 - (2547) (2549)
Coll: Oregon (2547); 50-100 m (2549,p36)

Bolivina advena Cushman, 1925 - (2547)
Coll: Oregon (2547)

Bolivina compacta - (2399,p68)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p68)
Hab: Rock and sand; 0-100' (2399,p68)

Bolivina interjuncta bicostata Cushman - (2547)
Coll: Oregon (2547)

Bolivina pacifica - (2399,p68)
Dist: Juan de fuca, Wash. to Cabo San Lucas, Mexico (2399,p68)
Hab: Sand; 100'->100' (2399,p68)

Bolivina pseudoplicata - (2547)
Coll: Oregon (2547)

PROTOZOA - SARCODINA - Foraminifera

Bolivina spissa Cushman, 1926 - (2547)
Coll: Oregon (2547)

Bolvinita minuta (Natland, 1938) - (2547)
Coll: Oregon (2547)

Buccella sp. - (2547) (2549,p36)
Coll: Oregon (2547)

Buccella frigida depressa Andersen, 1952 - (2547) (2549,p36)
Coll: Oregon (2547)
Hab: 17-50 m, indicative of shallow shelf fauna (2549,p36)

Buccella frigida frigida (Cushman, 1922) - (2547) (2549,p36)
Coll: Oregon (2547) (2549)
Hab: 17-100m, indicative of shallow shelf fauna (2549,p36)

Buccella tenerrima - (2399,p68) (2549,p36)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p68)
Hab: Rock and sand; 0-100' (2399,p68); 17-100 m, indicative of shallow shelf fauna (2549,p36)

Buliminella elegantissima - (2399,p68) (2549,p36)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p68)
Coll: Ore: rocky area off Cape Arago (2549,p36)
Hab: Sand; 0->100' (2399,p68); 17-100 m (2549,p36)

Buliminella exilis tenuata - (2547)
Coll: Oregon (2547)

Cassidella sp. - (2547)
Coll: Oregon (2547)

Cassidulina sp. - (2547)
Coll: Oregon (2547)

Cassidulina californica - (2547) (2549)
Coll: Oregon (2547)
Hab: 50-100 m; becomes dominant (2549,p36)

Cassidulina delicata Cushman, 1927 - (2547)
Coll: Oregon (2547)

PROTOZOA - SARCODINA - Foraminifera

Cassidulina depressa - (2547) (2549,p36)
Coll: Oregon (2547)
Hab: 50-100 m (2549,p36)

Cassidulina limbata - (2399,p68) (2549,p36)
Dist: Oregon to Cabo San Lucas, Mexico (2399,p68) (2549)
Coll: Oregon (2549)
Hab: Rock and sand; 0->100' (2399,p68); 50-100 m; becomes dominant (2549,p36)

Cassidulina minuta - (2547) (2549,p36)
Coll: Oregon (2547)
Hab: 50-100 m; becomes dominant (2549,p36)

Cassidulina subglobosa group - (2399,p68)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p68)
Hab: Rock and sand; 0->100' (2399,p68)

Cassidulina teretis Tappan, 1961 - (2547)
Coll: Oregon (2547)

Cassidulina tortuosa - (2547)
Coll: Oregon (2547)

Cassidulinoides rotundata - (2547)
Coll: Oregon (2547)

Chilostomella ovoidea Reuss, 1850 - (2547)
Coll: Oregon (2547)

Civicides sp. - (2399,p70)
Dist: Juan de Fuca, Wash. to Pt. Conception, Calif. (2399,p70)
Hab: Rock and sand; 0->100'(2399,p70)

Cibicides fletcheri - (2547) (2549,p36)
Coll: Oregon (2547)
Hab: 17-100 m; becomes dominant (2549,p36)

Cibicides lobatulus - (2547) (2549,p36)
Dist: Juan de Fuca, Wash. to Pt. Conception, Calif. (2399,p68)
Coll: Oregon (2547)
Hab: Rock and sand, 0->100' (2399,p68); 17-100 m; becomes dominant (2549,p36)

PROTOZOA - SARCODINA - Foraminifera

Cibicides phlegeri Uchio, 1960 - (2547)
Coll: Oregon (2547)

Cyclogyra incerta (D'Orbigny, 1839) - (2547)
Coll: Oregon (2547)

Dencrophyra arborescens - (2547) (2549)
Coll: Oregon (2547); 50-100 m (2549,p36)

Dentalina sp. - (2547)
Coll: Oregon (2547)

Dentalina ittai Loeblich and Tappan, 1953 - (2547)
Coll: Oregon (2547)

Discorbis columbiensis - (2547)
Coll: Oregon (2547)

Discorbis ornatissimus - (2547)
Coll: Oregon (2547)

Dyocibicides biseriolis - (2399,p70)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p70)
Hab: Rock and sand; 0->100' (2399,p70)

Dyocibicides cf. *D. perforata* - (2399,p70)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p70)
Hab: Rock and sand; 0->100' (2399,p70)

Eggerella advena - (2399,p70) (2549,p36)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p70)
Hab: Rock and sand; 40->100' (2399,p70); 17-100 m (2549,p36)

Eggerella scrippsi - (2547)
Coll: Oregon (2547)

Eilohedra levicula (Resig, 1958) - (2547)
Coll: Oregon (2547)

Elphidiella hannai - (2399,p70) (2549,p36)
Dist: Juan de Fuca, Wash. to Pt. Conception, Calif. (2399,p70)
Hab: Rock and sand; 0->100' (2399,p70); 17-50 m (2549,p36);
indicative of shallow shelf fauna (2549,p36)

PROTOZOA - SARCODINA - Foraminifera

Elphidium cf. *E. clavatum* - (2399,p70)
Dist: Juan de Fuca, Wash. to Pt. Conception, Calif. (2399,p70)
Hab: Rock and sand; 0->100' (2399,p70)

Elphidium crispum - (2399,p70)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p70)
Hab: Rock and sand; 0-100' (2399,p70)

Elphidium frigidum - (2399,p70) (2549,p36)
Dist: Juan de Fuca, Wash. to Pt. Conception, Calif. (2399,p70)
Hab: Rock and sand; 0-100' (2399,p70); 17-50 m (2549,p36)

Elphidium incertum - (2547) (2549,p36)
Coll: Oregon (2547)
Hab: 17-50 m (2549,p36); indicative of shallow shelf fauna (2549,p36)

Elphidium lene - (2399,p70)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p70)
Hab: Rock and sand; 0->100' (2399,p70)

Elphidium magellanicum - (2547) (2549,p36)
Coll: Oregon (2547)
Hab: 17-100 m, rocky area off Cape Arago (2549,p36)

Elphidium microgranulosum - (2547) (2549,p36)
Coll: Oregon (2547); 17-100 m (2549,p36)

Elphidium oregonense Cushman and Grant, 1927 - (2547)
Coll: Oregon (2547)

Elphidium subarcticum - (2547)
Coll: Oregon (2547)

Elphidium translucens - (2547)
Coll: Oregon (2547)

Elphidium tumidum - (2399,p70)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p70)
Hab: Rock and sand; 0-100' (2399,p70)

Epistominella exigua - (2547)
Coll: Oregon (2547)

PROTOZOA - SARCODINA - Foraminifera

Epistominella pacifica pacifica (Cushman, 1927) - (2547)
Coll: Oregon (2547)

Eponides columbiensis - (2547)
Coll: Oregon (2547)

Eponides repandus (Fitchel and Moll, 1798) - (2547)
Coll: Oregon (2547)

Fissurina lucida - (2399,p70)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p70)
Hab: Rock and sand; 0-100' (2399,p70)

Fissurina marginata (Montagu, 1803) - (2547)
Coll: Oregon (2547)

Gaudryina arenaria - (2547)
Coll: Oregon (2547)

Gaudryina subglabrata - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Glabratella cnariottensis - (2399,p70)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p70)
Hab: Rock and sand; 0->100' (2399,p70)

Glabratella opercularis - (2399,p70)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p70)
Hab: Rock and sand; 0->100' (2399,p70)

Globigerina sp. - (2547)
Coll: Oregon (2547)

Globigerina bulloides - (2547)
Coll: Oregon (2547)

Globigerina pachyderma - (2547)
Coll: Oregon (2547)

Globigerina quinqueloba - (2547)
Coll: Oregon (2547)

Globigerinita uvula - (2547)
Coll: Oregon (2547)

PROTOZOA - SARCODINA - Foraminifera

Globobulimina auriculata - (2547)
Coll: Oregon (2547)

Globobulimina pacifica - (2547)
Coll: Oregon (2547)

Glomospira gordialis (Jones and Parker, 1860) - (2547)
Coll: Oregon (2547)

Goesella flintii Cushman, 1936 - (2547)
Coll: Oregon (2547)

Gordiospira fragilis Heron-Allen and Earland - (2547)
Coll: Oregon (2547)

Guttulina sp. - (2547)
Coll: Oregon (2547)

Gyroidina altiformin Stewart and Stewart - (2547)
Coll: Oregon (2547)

Hanzawaia nitidula - (2399,p70)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p70)
Hab: Sand; 0->100' (2399,p70)

Haplophragmoides advena - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Haplophragmoides columbiensis columbiensis - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Haplophragmoides columbiensis evolutus - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Haplophragmoides hancocki - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Haplophragmoides subglobosus Cushman, 1910 - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Hippocrepinella alba Heron-Allen and Earland, 1932 - (2547)
Coll: Oregon (2547)

PROTOZOA - SARCODINA - Foraminifera

Lagena apiopleura Loeblich and Tappan - (2547)
Coll: Oregon (2547)

Lagena clavata - (2547)
Coll: Oregon (2547)

Lagena distoma - (2547)
Coll: Oregon (2547)

Lagena flexa Cushman and Gray, 1946 - (2547)
Coll: Oregon (2547)

Lagena gracilis - (2547)
Coll: Oregon (2547)

Lagena gracillima - (2547)
Coll: Oregon (2547)

Lagena hispida Reuss - (2547)
Coll: Oregon (2547)

Lagena laevis - (2547)
Coll: Oregon (2547)

Lagena nebulosa - (2547)
Coll: Oregon (2547)

Lagena semilineata Wright, 1886 - (2547)
Coll: Oregon (2547)

Lagena striata - (2547)
Coll: Oregon (2547)

Lagena striatopunctata - (2547)
Coll: Oregon (2547)

Lagena sulcata peculiaris Cushman - (2547)
Coll: Oregon (2547)

Lagena sulcata sulcata - (2547)
Coll: Oregon (2547)

PROTOZOA - SARCODINA - Foraminifera

Lenticulina sp. - (2547)
Coll: Oregon (2547)

Loxostomum pseudobeyrichi - (2547)
Coll: Oregon (2547)

Martinottiella nodulosa (Cushman, 1922) - (2547)
Coll: Oregon (2547)

Miliammina fusca - (2547)
Coll: Oregon (2547)

Milioinella californica - (2399,p72)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p72)
Hab: Rock and sand; 0->100' (2399,p72)

Nonionella auricula - (2547)
Coll: Oregon (2547)

Nonionella basispinata - (2399,p72)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p72)
Hab: Rock and sand; 0->100' (2399,p72)

Nonionella labrodorica - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Nonionella miocenica stella - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Nonionella scapha basispinata - (2547)
Coll: Oregon (2547)

Nonionella stella - (2399,p72)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p72)
Hab: Rock and sand; 40->100' (2399,p72)

Nonionella turgida digitata - (2547)
Coll: Oregon (2547)

Nouria polymorphinoides - (2547)
Coll: Oregon (2547)

PROTOZOA - SARCODINA - Foraminifera

Oolina lineata - (2547)
Coll: Oregon (2547)

Oolina melo - (2547)
Coll: Oregon (2547)

Patellina corrugata - (2399,p72)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p72)
Hab: Rock and sand; 0-100' (2399,p72)

Patellinoides conica Heron-Allen and Earland - (2547)
Coll: Oregon (2547)

Pateoris hauerinoides - (2547)
Coll: Oregon (2547)

Pateoris suborbicularis - (2547)
Coll: Oregon (2547)

Pionorbulina ocervalis - (2399,p72)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p72)
Hab: Rock and sand; 0-100' (2399,p72)

Polymorphina charlottensis Cushman, 1925 - (2547)
Coll: Oregon (2547)

Poroeponides cribrorepandus - (2399,p72)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p72)
Hab: Rock and sand; 0-100' (2399,p72)

Pullenia salisburyi Stewart and Stewart - (2547)
Coll: Oregon (2547)

Pyrgo sp. - (2547)
Coll: Oregon (2547)

Quinqueloculina akneriana bellatula Bandy, 1950 - (2547)
Coll: Oregon (2547), Juan de Fuca, Wash. (2399,p72)
Hab: Rock and sand, 0->100' (2399,p72)

Quinqueloculina dutemplei D'orbigny, 1846 - (2547)
Coll: Oregon (2547)

PROTOZOA - SARCODINA - Foraminifera

Quinqueloculina elongata - (2399,p72)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p72)
Hab: Rock and sand; 0->100' (2399,p72)

Quinqueloculina lamarkiana - (2399,p74)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p74)
Hab: Rock and sand; 0->100' (2399,p74)

Quinqueloculina sabulosa - (2399,p74)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p74)
Hab: Rock and sand; 0->100' (2399,p74)

Quinqueloculina stalkeri Loeblich and Tappan, 1953 - (2547)
Coll: Oregon (2547)

Recurvoides turbinatus - (2547) (2549)
Coll: Oregon (2547); 50-100 m (2549,p36)

Reophax agglutans Cushman, 1913 - (2547)
Coll: Oregon (2547)

Reophax curtus - (2547)
Coll: Oregon (2547)

Reophax dentalinaformis - (2547)
Coll: Oregon (2547)

Reophax horridus Cushman, 1912 - (2547)
Coll: Oregon (2547)

Reophax nanus - (2399,p74)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p74)
Hab: Rock and sand; 0-100' (2399,p74)

Reophax scorpiurus - (2547)
Coll: Oregon (2547)

Reophax scotti Chaster, 1890-91 - (2547)
Coll: Oregon (2547)

Reophax subdentalinaformis Parr, 1950 - (2547)
Coll: Oregon (2547)

PROTOZOA - SARCODINA - Foraminifera

Rhizammina algeformis Brady, 1879 - (2547)
Coll: Oregon (2547)

Robertinoides charlottensis - (2547)
Coll: Oregon (2547)

Rosalina columbiensis - (2399,p74) (2549,p36)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p74)
Hab: Rock and sand; 0-100' (2399,p74); 50-100 m (2549,p36)

Rotorbinella campanulata - (2399,p74)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p74)
Hab: Rock and sand; 0->100' (2399,p74)

Saccammina atlantica - (2547)
Coll: Oregon (2547)

Scutoloris cf. *tegminis* Loeblich and Tappan, 1953 - (2547)
Coll: Oregon (2547)

Sigmoilina cf. *tenuis* (Czjzek) - (2547)
Coll: Oregon (2547)

Spirillina cf. *S. obconica* - (2547)
Coll: Oregon (2547)

Spiroplectammina biformis - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Streblus beccarii - (2399,p74)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico(2399,p74)
Hab: Rock and sand; 0-100' (2399,p74)

Suggrunda eckisi - (2547)
Coll: Oregon (2547)

Textularia earlandi - (2547)
Coll: Oregon (2547)

Textularia gracillima - (2547)
Coll: Oregon (2547)

Textularia sandiegoensis Uchio, 1960 - (2547)
Coll: Oregon (2547)

Thalmanammina parkerae (Uchio, 1960) - (2547)
Coll: Oregon (2547)

Trichohyolus ornatissima - (2399,p74)
Dist: Juan de Fuca, Wash. to Pt. Conception, Calif. (2399,p74)
Hab: Rock and sand; 0-100' (2399,p74)

Trifarina angulosa - (2547)
Coll: Oregon (2547)

Trifarina baggi - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Triloculina oblonga (Montagu, 1803) - (2547)
Coll: Oregon (2547)

Triloculina trigonula (Lamarck, 1804) - (2547)
Coll: Oregon (2547)

Triloculina trihedra Loeblich and Tappan, 1953 - (2547)
Coll: Oregon (2547)

Trochammina arctica - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Trochammina charlottensis - (2399,p74) (2549,p36)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p74)
Coll: Oregon, 50-100 m (2549,p36)
Hab: Rock and sand; 0->100' (2399,p74)

Trochammina discorbis Earland, 1934 - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Trochammina inflata - (2547) (2549)
Coll: Oregon (2547); 50-100 m (2549,p36)

Trochammina kellettae - (2399,p74) (2549,p36)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p74)
Coll: Oregon, 50-100 m (2549,p36)
Hab: Rock and sand; 0->100' (2399,p74)

Trochammina macrescens - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Trochammina ochracea - (2547) (2549)
Coll: Oregon (2547); 50-100 m (2549,p36)

Trochammina pacifica - (2399,p74) (2549)
Dist: Juan de Fuca, Wash. to Cabo San Lucas, Mexico (2399,p74)
Hab: Rock and sand; 0->100' (2399,p74); 50-100 m (2549,p36)

Trochammina squamiformis - (2547) (2549,p36)
Coll: Oregon (2547); 50-100 m (2549,p36)

Turritellella shoneana - (2547)
Coll: Oregon (2547)

Uvigerina juncea - (2547)
Coll: Oregon (2547)

Uvigerina peregrina - (2547)
Coll: Oregon (2547)

Order: Heliozoa
Suborder: Aphrothoracidae

Actinolophus pedunculatus F. E. Schulze - (2555,p7)
Coll: B. C.: Nanoose harbour and Gabriola Pass, Strait of Georgia (2555,p7)
Hab: In shallow water attached to diatoms (*Melosira*) (2555,p7)

Actinophrys sol Ehrenb. - (2555,p7)
Coll: B. C.: Departure Bay and Strait of Georgia (2555,p7)
Hab: In algae infusions (2555,p7)

Microsol borealis (Meresch.) Dons. - (2555,p7)
Coll: B. C.: Departure Bay, Puget Sound (2555,p7)
Hab: Attached to algae, shells, etc. (2555,p7)

Suborder: Chalarothoracidae

Acanthocystis brevicirrhis (Perty) - (2555,p9)
  Coll: B. C.: Deep Bay, Burrard inlet, near the outfall from Lake Buntzen (2555,p9)

Acanthocystis spinifera Greeff - (2555,p9)
  Coll: B. C.: Barkley Sound, Strait of Georgia (2555,p9)
  Hab: Often numerous during August and September (2555,p9)

Heterophrys marina Hertwig and Lesser - (2555,p8)
  Coll: B. C.: Barkley Sound, Strait of Georgia (2555,p8)
  Hab: Scarce (2555,p8)

Wagnerella borealis Mereschkowsky - (2555,p8)
  Coll: B. C.: Strait of Georgia, Barkley Sound (2555,p8)
  Hab: Dredged from 10-20 fathoms, often numerous locally (2555,p8)

Order: Radiolaria

Acanthometron pellucidum J. Müller - (2555,pl2)
  Coll: B. C.: Generally distributed, not uncommon (2555,pl2)

Cenosphaera polygonalis Haeckel - (2555,pl0)
  Coll: B. C.: Departure Bay, February (2555,pl0)

Cenosphaera proserpinae Haeckel - (2555,pl0)
  Coll: B. C.: Departure Bay, February and March (2555,pl0)

Challengeron depauperatum Wailes - (2555,pl4)
  Coll: B. C.: Off the coast of Vancouver Island throughout the year; common on the west coast, rare on the east coast (2555,pl4)

Dictyophimus histricosus Joergensen - (2555,pl3)
  Coll: B. C.: Off the west coast of Vancouver Island throughout the year, scarce; Strait of Georgia in the winter months, rare (2555,pl3)

PROTOZOA - SARCODINA - Radiolaria

Hexastylus triaxonius Haeckel - (2555,pl1)
Coll: B. C.: Strait of Georgia, March (2555,pl1)

Lithomelissa setosa Joergensen - (2555,pl3)
Coll: B. C.: Generally distributed, common (2555,pl3)

Phormacantha hystrix (Joergensen) - (2555,pl2)
Coll: B. C.: Strait of Georgia, December and March (2555,pl2)

Plectacantha oikiskos Joergensen - (2555,pl2)
Coll: B. C.: Strait of Georgia, March (2555,pl2)

Protocystis aurita Wallich - (2555,pl4)
Coll: B. C.: West coast of Vancouver Island, rare (2555,pl4)

Protocystis tridens (Haeckel) - (2555,pl4)
Coll: B. C.: East and west coasts of Vancouver Island throughout the year (2555,pl4)

Rhizoplegma boreale (Cleve) Joergensen - (2555,pl1)
Coll: B. C.: Strait of Georgia, February and March (2555,pl1)

Class: MASTIGOPHORA

Amphidinium crassum Lohmann - (2556,pl5)
Coll: B. C.: Strait of Georgia, rare (2556,pl5)

Amphidinium ovoideum Lemmermann - (2556,pl6)
Coll: B. C.: Departure Bay (2556,pl6)
Hab: Tide pools, numerous in March (2556,pl6)

Anisonema acinus Dujardin - (2556,p8)
Coll: B. C.: Departure Bay (2556,p8)
Hab: Among shore algae, marine and freshwater (2556,p8)

Anisonema vitraea (Dujardin) - (2556,p8)
Coll: B. C.: Departure Bay (2556,p8)
Hab: Among algae, marine and freshwater (2556,p8)

PROTOZOA - MASTIGOPHORA

Bicosoeca gracillipes James Clark - (2556,p6)
Coll: B. C.: Departure Bay (2556,p6)
Hab: On brown algae (2556,p6)

Bicosoeca pocillum Saville Kent - (2556,p6)
Coll: B. C.: Nanaimo, False Narrows Reef (2556,p6)
Hab: On diatoms (2556,p6)

Bodo caudatus (Dujardin) - (2556,p3)
Coll: B. C.: Departure Bay (2556,p3)
Hab: Among algae (2556,p3)

Bodo lens (O. F. Müller) - (2556,p3)
Coll: B. C.: Departure Bay (2556,p3)
Hab: In algal infusions and decaying matter, in plankton (2556,p3)

Bodo rostratus (Saville Kent) - (2556,p3)
Coll: B. C.: Departure Bay (2556,p3)
Hab: Among algae and in plankton (2556,p3)

Ceratium azoricum Cleve - (2556,p44)
Coll: B. C.: Off the west coast of Vancouver Island, not common (2556,p44)

Ceratium divaricatum Lemmermann - (2556,p44)
Coll: B. C.: Off the west coast of Vancouver Island, common; Strait of Georgia, rare (2556,p44)

Ceratium furca (Ehrenberg) - (2556,p44)
Coll: B. C.: On occasions is the dominant species in the neritic plankton (2556,p44)

Ceratium fusus (Ehrenberg) - (2556,p42)
Coll: B. C.: Generally distributed, abundant (2556,p42)

Ceratium hirundinella (O. F. Müller) - (2556,p42)
Coll: B. C.: (2556)
Hab: A polymorphic freshwater species found near the mouths of rivers, scarce in a marine habitat (2556,p42)

Ceratium hirundinella var. *carinthaceum* Zederbauer - (2556,p43)
Coll: B. C.: Forward inlet, Quatsino Sound, scarce (2556,p43)

PROTOZOA - MASTIGOPHORA

Ceratium horridum Gran - (2556,p45)
Coll: B. C.: Generally distributed but not abundant (2556,p45)

Ceratium lineatum (Ehrenberg) - (2556,p43)
Coll: B. C.: Generally distributed, sometimes numerous (2556,p43)

Ceratium longpipes (Bailey) - (2556,p45)
Coll: B. C.: Generally distributed but not common (2556,p45)

Ceratium macroceros (Ehrenberg) - (2556,p45)
Coll: B. C.: Generally distributed, often abundant (2556,p45)

Ceratium pentagonum Gourret - (2556,p43)
Coll: B. C.: Off the west coast of Vancouver Island, not uncommon (2556,p43)

Ceratium tripos var. atlantica Ostenfeld - (2556,p44)
Coll: B. C.: Generally distributed, often plentiful but never found dominant in the plankton (2556,p44)

Cochlodinium archimedes (Pouchet) - (2556,p21)
Coll: B. C.: Off Cortes Island, Strait of Georgia, June (2556,p21)

Cochlodinium catenatum Okamura - (2556,p21)
Coll: B. C.: Off Cortes Island, August (2556,p21)

Cochlodinium conspiratum Kofoid and Swezy - (2556,p21)
Coll: B. C.: Strait of Georgia (2556,p21)

Cochlodinium vinctum Kofoid and Sweqy - (2556,p21)
Coll: B. C.: Strait of Georgia (2556,p21)

Codonoeca gracilis Calkins - (2556,p5)
Coll: B. C.: Gabriola Pass (2556,p5)
Hab: On algae (2556,p5)

Cryptochrysis polychrysis Pascher - (2556,p7)
Coll: B. C.: Departure Bay off wharf (2556,p7)
Hab: In plankton (2556,p7)

Dictyocha fibula var. longispina Lemmermann - (2556,p9)
Coll: B. C. (2556)
Hab: Not uncommon in neritic plankton (2556,p9)

PROTOZOA - MASTIGOPHORA

Dinobryon balticum Schütt - (2556,p8)
Coll: B. C.: Kyuquot Sound (2556,p8)
Hab: In brackish water near the head (2556,p8)

Dinophysis acuminata Claparède and Lachman - (2556,p24)
Coll: B. C.: Generally distributed, often numerous (2556,p24)

Dinophysis acuta Ehrenberg - (2556,p25)
Coll: B. C.: Generally distributed, occasionally numerous (2556,p25)

Dinophysis ellipsoides Kofoid - (2556,p24)
Coll: B. C.: Generally distributed, often abundant off west coast of Vancouver Island (2556,p24)

Dinophysis hastata Stein - (2556,p24)
Coll: B. C.: Off east and west coasts of Vancouver Island, scarce (2556,p24)

Dinophysis lenticulata Pavillard - (2556,p24)
Coll: B. C.: Generally distributed (2556,p24)

Dinophysis norvegica Claparède and Lachmann - (2556,p24)
Coll: B. C.: Generally distributed but not numerous (2556,p24)

Dinophysis parva Schiller - (2556,p25)
Coll: B. C.: Generally distributed, sometimes numerous (2556,p25)
Hab: In neritic plankton (2556,p25)

Dinophysis rotundata var. intermedia Lindemann - (2556,p25)
Coll: B. C.: Departure Bay, rare (2556,p25)

Dinophysis tripos Gouret - (2556,p23)
Coll: B. C.: Off west coast of Vancouver Island, scarce; Strait of Georgia, rare (2556,p23)

Diplopeltopsis minor Lebour - (2556,p29)
Coll: B. C.: Generally distributed, common (2556,p29)

Diplopeltopsis minor var. occidentalis Wailes - (2556,p29)
Coll: B. C.: West coast of Vancouver Island, scarce (2556,p29)

PROTOZOA - MASTIGOPHORA

Distephanus octangulatus Wailes - (2556,p10)
Coll: B. C.: Off west coast of Vancouver Island (2556,p10)
Hab: Found in pilchards (2556,p10)

Distenphanus pentagonus Wailes - (2556,p10)
Coll: B. C.: Caught off west coast of Vancouver Island (2556,p10)
Hab: Found in pilchards (2556,p10)

Distephanus speculum (Ehrenberg) - (2556,p9)
Coll: B. C.: (2556)
Hab: In the neritic plankton, not very common (2556,p9)

Distephanus speculum var. regularis Lemmermann - (2556,p9)
Coll: B. C.: (2556)
Hab: Common in neritic plankton, spores rare (2556,p9)

Ebria tripartita (Schumberger) - (2556,p10)
Coll: B. C.: (2556)
Hab: Generally distributed in neritic plankton, not uncommon (2556,p10)

Exuviella apora Schiller - (2556,p11)
Coll: B. C.: West coast of Vancouver Island (2556,p11)

Glenodinium danicum Paulsen - (2556,p25)
Coll: B. C.: Generally distributed, plentiful (2556,p25)

Gonyaulax alaskensis Kofoid - (2556,p27)
Coll: B. C.: Generally distributed, scarce (2556,p27)

Gonyaulax digitale (Pouchet) - (2556,p28)
Coll: B. C.: Generally distributed, not uncommon off west coast of Vancouver Island (2556,p28)

Gonyaulax longispina Lebour - (2556,p27)
Coll: B. C.: West coast of Vancouver Island, rare (2556,p27)

Gonyaulax polygramma Stein - (2556,p28)
Coll: B. C.: West coast of Vancouver Island, scarce (2556,p28)

Gonyaulax scrippsae Kofoid - (2556,p28)
Coll: B. C.: Strait of Georgia, west coast of Vancouver Island, rare (2556,p28)

PROTOZOA - MASTIGOPHORA

Gonyaulax spinifera (Claparède and Lachmann) - (2556,p28)
Coll: B. C.: Generally distributed, occasionally numerous (2556,p28)

Gonyaulax tricantha Joergensen - (2556,p27)
Coll: B. C.: Generally distributed, scarce (2556,p27)

Gymnodium abbreviatum Kofoid and Swezy - (2556,p18)
Coll: B. C.: Numberous off Camp Island, Strait of Georgia, July and August (2556,p18)

Gymnodinium arcticum Wulff - (2556,p18)
Coll: B. C.: Off Cortes Island, Strait of Georgia, rare (2556,p18)

Gymnodinium bicorne Kofoid and Swezy - (2556,p18)
Coll: B. C.: Generally distributed, scarce (2556,p18)

Gymnodinium flavum Kofoid and Swezy - (2556,p17)
Coll: B. C.: Departure Bay, June to August (2556,p17)

Gymnodinium heterostriatum Kofoid and Swezy - (2556,p17)
Coll: B. C.: Off Cortes Island, Strait of Georgia (2556,p17)

Gymnodinium lunula Schütt - (2556,p18)
Coll: B. C.: Generally distributed, sometimes numerous (2556,p18)

Gymnodinium multistriatum Kofoid and Swezy - (2556,p17)
Coll: B. C.: Off Cortes Island, Strait of Georgia, July and August (2556,p17)

Gymnodinium rubrum Kofoid and Swezy - (2556,p16)
Coll: B. C.: Strait of Georgia (2556,p16)

Gymnodinium scopulosum Kofoid and Swezy - (2556,p18)
Coll: B. C.: Strait of Georgia, not uncommon (2556,p18)

Gymnodinium splendens Lebour - (2556,p17)
Coll: B. C.: Generally distributed, common (2556,p17)

Gymnodinium variabile C. Herdmann - (2556,p17)
Coll: B. C.: Off Cortes Island, rare (2556,p17)

PROTOZOA - MASTIGOPHORA

Gyrodinium corallinum Kofoid and Swezy - (2556,p18)
Coll: B. C.: Strait of Georgia (2556,p18)

Gyrodinium fulvum Kofoid and Swezy - (2556,p20)
Coll: B. C.: Strait of Georgia, not uncommon July and August (2556,p20)

Gyrodinium glaucum Lebour - (2556,p20).
Coll: B. C.: Strait of Georgia (2556,p20)

Gyrodinium ochraceum Kofoid and Swezy - (2556,p19)
Coll: B. C.: Off Cortes Island (2556,p19)

Gyrodinium pepo (Schütt) - (2556,p20)
Coll: B. C.: Strait of Georgia (2556,p20)

Gyrodinium pingue (Schütt) - (2556,p20)
Coll: B. C.: Strait of Georgia, not uncommon (2556,p20)

Gyrodinium postmaculatum Kofoid and Swezy - (2556,p20)
Coll: B. C.: Off Cortes Island, numerous in July and August, Departure Bay, rare (2556,p20)

Gyrodinium spirale (Bergh) - (2556,p19)
Coll: B. C.: Strait of Georgia, common (2556,p19)

Minuscula bipes (Paulsen) - (2556,p41)
Coll: B. C.: Generally distributed, scarce (2556,p41)

Monosiga ovata Saville - (2556,p3)
Coll: B. C.: Departure Bay, Gabriola Pass (2556,p3)
Hab: On algae, diatoms, etc. (2556,p3)

Nematodinium armatum Dogiel - (2556,p13)
Coll: B. C.: Strait of Georgia, common in summer (2556,p13)

Noctiluca scintillans (Macartney) - (2556,p15)
Coll: B. C.: Generally distributed (2556,p15); occasionally so numerous as to color large areas a reddish or pinkish hue, their remains forming windrows on beaches. This species is well known for its luminescent qualities (2556,p15)
Hab: Pelagic (2556,p15)

PROTOZOA - MASTIGOPHORA

Oxyrrhis marina Dujardin - (2556,p7)
Coll: B. C.: Nanoose Bay, 10-15 fathoms, Departure Bay (2556,p7)

Oxytoxum diploconus var. *fusiformis* Okamura - (2556,p41)
Coll: B. C.: Generally distributed, scarce (2556,p41)

Peridiniopsis asymmetrica Mangin - (2556,p29)
Coll: B. C.: Generally distributed, common (2556,p29)

Peridiniopsis rotunda Lebour - (2556,p29)
Coll: B. C.: Generally distributed, scarce (2556,p29)

Perdinium achromaticum Levander - (2556,p34)
Coll: B. C.: Generally distributed, seldom numerous (2556,p34)

Peridinium asperum Wailes - (2556,p40)
Coll: B. C.: Off the west coast of Vancouver Island, sometimes abundant, not recorded from elsewhere (2556,p40)

Peridinium avellana Meunier - (2556,p32)
Coll: B. C.: Off west coast of Vancouver Island, scarce except occasionally (2556,p32)

Peridinium brevipes Paulsen - (2556,p40)
Coll: B. C.: Generally distributed, scarce (2556,p40)

Peridinium cerasus Paulsen - (2556,p40)
Coll: B. C.: Generally distributed, not numerous (2556,p40)

Peridinium claudicans Paulsen - (2556,p36)
Coll: B. C.: Generally distributed, sometimes numerous (2556,p37)

Peridinium conicoides Paulsen - (2556,p33)
Coll: B. C.: Generally distributed, numerous (2556,p33)

Peridinium conicum (Gran) - (2556,p34)
Coll: B. C.: Generally distributed, numerous (2556,p34)

Peridinium crassipes Kofoid - (2556,p38)
Coll: B. C.: Generally distributed, often numerous off west coast of Vancouver Island (2556,p38)

PROTOZOA - MASTIGOPHORA

Peridinium decipiens Joergensen - (2556,p31)
Coll: B. C.: Off west coast of Vancouver Island, rare (2556,p31)

Peridinium depressum Bailey - (2556,p35)
Coll: B. C.: Generally distributed, dominant species in Canadian Pacific area, persistent throughout year (2556,p35)

Peridinium discoides Wailes - (2556,p31)
Coll: B. C.: Generally distributed, sometimes abundant (2556,p31)

Peridinium divergens Ehrenberg - (2556,p38)
Coll: B. C.: Off west coast of Vancouver Island, not uncommon; Strait of Georgia, scarce (2556,p38)

Peridinium excentricum Paulsen - (2556,p30)
Coll: B. C.: Generally distributed, often abundant off west coast of Vancouver Island (2556,p30)

Peridinium faeroense Paulsen - (2556,p34)
Coll: B. C.: Generally distributed, rare (2556,p34)

Peridinium grani Ostenfeld - (2556,p38)
Coll: B. C.: Generally distributed, sometimes numerous (2556,p38)

Peridinium leonis Pavillard - (2556,p33)
Coll: B. C.: Generally distributed, numerous (2556,p33)

Peridinium micrapium Meunier - (2556,p39)
Coll: B. C.: Generally distributed, abundant (2556,p39)

Peridinium minutum Kofoid - (2556,p32)
Coll: B. C.: Generally distributed (2556,p32)

Peridinium monocanthus Broch - (2556,p39)
Coll: B. C.: Strait of Georgia, Barkley Sound, scarce (2556,p39)

Peridinium monospinum Paulsen - (2556,p32)
Coll: B. C.: Generally distributed (2556,p32)

Peridinium oblongum (Aurivillius) - (2556,p36)
Coll: B. C.: Generally distributed, abundant; usually in association with P. depressum (2556,p36)

Peridinium obtusum Karsten - (2556, p36)
Coll: B. C.: Generally distributed, common (2556, p36)

Peridinium ovatum var. minor Cleve - (2556, p38)
Coll: B. C.: Generally distributed, not numerous (2556, p38)

Peridinium pallidum Ostenfeld - (2556, p40)
Coll: B. C.: Generally distributed, common (2556, p40)

Peridinium pellucidum (Bergh) - (2556, p41)
Coll: B. C.: Generally distributed, common (2556, p41)

Peridinium pentagonum Gran - (2556, p34)
Coll: B. C.: Generally distributed, sometimes numerous (2556, p34)

Peridinium punctulatum Paulsen - (2556, p37)
Coll: B. C.: Generally distributed, not common (2556, p37)

Peridinium saltans Meunier - (2556, p35)
Coll: B. C.: Generally distributed, scarce (2556, p35)

Peridinium subcurvipes Lebour - (2556, p39)
Coll: B. C.: Strait of Georgia, rare (2556, p39)

Peridinium subinerme Paulsen - (2556, p33)
Coll: B. C.: Generally distributed (2556, p33)

Peridinium subpunctulatum Wailes - (2556, p37)
Coll: B. C.: Generally distributed, not common, not recorded from elsewhere (2556, p37)

Peridinium thorianum Paulsen - (2556, p31)
Coll: B. C.: Generally distributed, common (2556, p31)

Peridinium triqueta (Stein) - (2556, p31)
Coll: B. C.: Generally distributed, spores sometimes occur in large numbers (2556, p31)

Peridinium trochoideum (Stein) - (2556, p34)
Coll: B. C.: Generally distributed. Occasionally large areas of water are colored reddish by presence of vast numbers of this species (2556, p34)

PROTOZOA - MASTIGOPHORA

Phalacroma rotundatum Claparède and Lachman - (2556,p23)
Coll: B. C.: Generally distributed, common (2556,p23)

Podolampas palmipes Stein - (2556,p45)
Coll: B. C.: Strait of Georgia, rare (2556,p45)

Polykrikos kofoidi Chatton - (2556,p12)
Coll: B. C.: Generally distributed (2556,p12)

Polykrikos schwartzi Bütschli - (2556,p13)
Coll: B. C.: Generally distributed (2556,p13)

Polyoeca dichotoma Saville Kent - (2556,p5)
Coll: B. C.: (2565)

Pouchetia maxima Kofoid and Swezy - (2556,p14)
Coll: B. C.: Off Cortes Ialsnd (2556,p14)

Pouchetia panamensis Kofoid - (2556,p14)
Coll: B. C.: Strait of Georgia (2556,p14)

Pouchetia rubescens Kofoid and Swezy - (2556,p14)
Coll: B. C.: Off Cortes Island (2556,p14)

Pouchetia violescens Kofoid and Swezy - (2556,p14)
Coll: B. C.: Off Cortes Island (2556,p14)

Prorocentrum gracile Schütt - (2556,p11)
Coll: B. C.: (2556)
Hab: Generally distributed in plankton; occasionally dominant in Nannoplankton (2556,p11)

Protoceratium reticulatum Claparède and Lachmann - (2556,p26)
Coll: B. C.: Generally distributed, occasionally numerous (2556,p26)

Pseudophalacroma nasutum (Stein) - (2556,p22)
Coll: B. C.: Generally distributed, scarce (2556,p22)

Salpingoeca campanula Saville - (2556,p4)
Coll: B. C.: False Narrows Reef (2556,p4)
Hab: On algae (2556,p4)

PROTOZOA - MASTIGOPHORA

Salpingoeca infusionum Saville Kent - (2556,p4)
Coll: B. C.: Departure Bay, Gabriola Pass (2556,p4)
Hab: On algae, on *Polyzoa* (2556,p4)

Salpingoeca marina James Clark - (2556,p4)
Coll: B. C.: Departure Bay, False Narrows Reef (2556,p4)
Hab: On shells and algae (2556,p4)

Torodinium robustum Kofoid and Swezy - (2556,p22)
Coll: B. C.: Off Cortes Island, July and August, scarce (2556,p22)

Class: CILIATA

Amphisia pernix Wrzesniowski - (2557,p28)
Coll: B. C.: Departure Bay (2557,p28)
Hab: Amongst algae (2557,p28)

Carchesium polypinum Linnaeus - (2557,p33)
Coll: B. C.: Strait of Georgia (2557,p33)
Hab: On algae, a marine and freshwater species (2557,p33)

Chaenia teres Dujardin - (2557,p3)
Coll: B. C.: Strait of Georgia (2557,p3)
Hab: Among decayed algae, freshwater and marine (2557,p3)

Colpidium colpoda Ehrenberg - (2557,p8)
Coll: B. C.
Hab: Amongst algae and in infusions, common (2557,p8)

Cothurnia cali Kahl - (2557,p35)
Coll: B. C.: Departure Bay (2557,p35)
Hab: On algae and hydroids, rare (2557,p35)

Cothurnia compressa forma *sinuosa* Wailes - (2557,p35)
Coll: B. C.: Strait of Georgia (2557,p35)
Hab: On green algae, rare (2557,p35)

Cothurnia compressula Kahl - (2557,p35)
Coll: B. C.: Departure Bay, Gabriola Pass, Saanich Inlet (2557,p35)
Hab: On *Obelia* and red algae, on *Bugela*, at 50 fathoms on the copepod *Diosaccus* sp., scarce (2557,p35)

PROTOZOA - CILIATA

Cothurnia fecunda Stokes - (2557,p36)
Coll: B. C.: Generally distributed, numerous; also in freshwater (2557,p36)
Hab: On algae and hydroids, rarely on copepods (Diosaccus) and on polychaete worms (Trophonia papillata) (2557,p36)

Cothurnia flexa (Wailes) Kahl - (2557,p34)
Coll: B. C.: Strait of Georgia (2557,p34)
Hab: On algae, common (2557,p34)

Cothurnia gracilis Saville Kent - (2557,p34)
Coll: B. C.: Departure Bay, Saanich Inlet (2557,p34)
Hab: On red algae, on copepod Diosaccus (2557,p34)

Cothurnia lata Kellicott f. columbiae Wailes - (2557,p35)
Coll: B. C.: Departure Bay (2557,p35)
Hab: On Copepoda (2557,p35)

Cothurnia ovalis Kahl - (2557,p36)
Coll: B. C.: Departure Bay (2557,p36)
Hab: On algae, not uncommon (2557,p36)

Cothurnia polculum Kahl - (2557,p34)
Coll: B. C.: Departure Bay (2557,p34)
Hab: On red algae, scarce (2557,p34)

Dictyocysta apiculata Wailes - (2557,p25)
Coll: B. C.: Departure Bay
Hab: No other similar lorica has since been seen and this may be an abnormal individual (2557,p25)

Dictyocysta elegans Ehrenberg (emended K. and C.) - (2557,p25)
Coll: B. C.: West coast of Vancouver Island (2557,p25)
Hab: Scarce (2557,p25)

Dictyocysta reticulata Kofoid and Campbell - (2557,p25)
Coll: B. C.: Barkley Sound, June (2557,p25)

Didinium balbiani Bütschli - (2557,p5)
Coll: B. C.
Hab: Among algae in beach pools, occasionally in plankton near shore, fresh and brackish water (2557,p5)

PROTOZOA - CILIATA

Didimium nasutum O. F. Müller - (2557,p5)
Coll: B. C.: Departure Bay (2557,p5)
Hab: In plankton off float and among algae, freshwater and marine (2557,p5)

Dysteria monostyla (Ehrenberg) - (2557,p6)
Coll: B. C.: Departure Bay (2557,p6)
Hab: Among algae and hydrozoa (2557,p6)

Epiclintes radiosa (Quennerstedt) - (2557,p28)
Coll: B. C.: Departure Bay (2557,p28)
Hab: On *Zostera* (2557,p28)

Euplotes sexcostatus (Wailes) - (2557,p28)
Coll: B. C.: In Strait of Georgia (2557,p28)
Hab: On algae, generally distributed, hydroids, etc. (2557,p28)

Favella ehrenbergi (Claparède and Lachmann) - (2557,p20)
Coll: B. C.: Generally distributed, but not uncommon (2557,p20)

Favella franciscana Kofoid and Campbell - (2557,p20)
Coll: B. C.: Generally distributed, frequently abundant on west coast of Vancouver Island (2557,p20)

Favella serrata (Moebius) - (2557,p20)
Coll: B. C.: Generally distributed, scarce (2557,p20)

Folliculina ampulla O. F. Müller - (2557,p10)
Coll: B. C.: Strait of Georgia (2557,p10)
Hab: On algae, Bryozoa, dredged from depths down to 40 meters (2557,p10)

Frontonia marina Fabre-Domergue - (2557,p7)
Coll: B. C.
Hab: Amongst algae (2557,p7)

Halteria grandinella Müller - (2557,p11)
Coll: B. C.: Departure Bay (2557,p11)
Hab: Tide pools of brackish water (2557,p11)

Heliocostomella kiliensis (Laackmann) - (2557,p19)
Coll: B. C.: Off Nootka Sound (2557,p19)

PROTOZOA - CILIATA

Heliocostomella subulata (Ehrenberg) - (2557,p19)
Coll: B. C.
Dist: Generally distributed, sometimes numerous (2557,p19)

Lacrymaria lagenula Claparède and Lachmann - (2557,p3)
Coll: B. C.: Strait of Georgia (2557,p3)
Hab: Among decayed algae (2557,p3)

Lacrymaria olor O. F. Müller - (2557,p4)
Coll: B. C.: Strait of Georgia (2557,p4)
Hab: Among algae, freshwater and marine (2557,p4)

Lembus elongatus Claparède and Lachmann - (2557,p8)
Coll: B. C.
Hab: In infusions of algae (2557,p8)

Lionotus anser (Ehrenberg) - (2557,p6)
Coll: B. C.
Hab: Amongst algae, brackish and freshwater (2557,p6)

Lionotus fasciola O. F. Müller - (2557,p6)
Coll: B. C.
Hab: Amongst algae, freshwater and marine (2557,p6)

Loxophyllum meleagris O. F. Müller - (2557,p5)
Coll: B. C.
Hab: Amongst algae in beach pools, freshwater and marine (2557,p5)

Mesodinium pulex Claparède and Lachmann - (2557,p4)
Coll: B. C.
Hab: Among algae and decayed vegetation in beach pools, brackish and freshwater (2557,p4)

Mesodinium rubrum (Lohmann) - (2557,p4)
Coll: B. C.: Departure Bay (2557,p4)
Hab: In plankton off float, numerous at times, marine and brackish water (2557,p4)

Metopus es O. F. Müller - (2557,p9)
Coll: B. C.
Hab: Amongst marine algae and in infusions, generally distributed (2557,p9)

PROTOZOA - CILIATA

Nassula microstoma Cohn - (2557,p6)
Coll: B. C.
Hab: Amongst shore algae, freshwater and marine (2557,p6)

Parafavella gigantea (Brandt) emended K. and C. - (2557,p21)
Coll: B. C.: West coast of Vancouver Island, Bull Harbour, numerous at times (2557,p21)

Parafavella parumdentata (Brandt) - (2557,p21)
Coll: B. C.: West coast of Vancouver Island, Bull Harbour, Queen Charlotte Sound (2557,p21)
Hab: Usually associated with *P. gigantea* (2557,p21)

Paramacium caudatum Ehrenberg - (2557,p8)
Coll: B. C.
Hab: Amongst algae, freshwater and marine (2557,p8)

Parundella lagena Kofoid and Campbell - (2557,p23)
Coll: B. C.: Strait of Georgia, Departure Bay, occasionally numerous (2557,p23)

Parundella lachmanni (Daday) - (2557,p23)
Coll: B. C.: Generally distributed, scarce (2557,p23)

Parundella major (Wailes) K. and C. - (2557,p24)
Coll: B. C.: Generally distributed, not common (2557,p24)

Parundella minor (Wailes) K. and C. - (2557,p24)
Coll: B. C.: Generally distributed, scarce (2557,p24)

Parundella translucens (Wailes) K. and C. - (2557,p23)
Coll: B. C.: Generally distributed, sometimes numerous (2557,p23)

Peritromus emmae Stein - (2557,p27)
Coll: B. C.: Departure Bay at wharf (2557,p27)

Placus socialis Fabre-Domergue - (2557,p8)
Coll: B. C.: Departure Bay in plankton off wharf (2557,p8)

Platycola (*Vaginicola*) *nigra* Wailes - (2557,p36)
Coll: B. C.: William Head, Strait of Juan de Fuca on clam shells (*Cardium* and *Saxidomus*) (2557,p36)

PROTOZOA - CILIATA

Proplectella columbiana (Wailes) K. and C. - (2557,p24)
Coll: B. C.: Generally distributed, not uncommon (2557,p24)

Ptychocylis drygalskii Brandt - (2557,p21)
Coll: B. C.: Generally distributed, common (2557,p21)

Ptychocylis minor Joergensen - (2557,p22)
Coll: B. C.: Generally distributed (2557,p22)

Ptychocylis repanda Wailes - (2557,p22)
Coll: B. C.: Strait of Georgia, Departure Bay (2557,p22)
Hab: The type scarce, f. *conica* occasionally numerous (2557,p22)

Ptychocylis urnula Claparède and Lachmann - (2557,p22)
Coll: B. C.: Generally distributed, common (2557,p22)

Ptychocylis wailesi Kofoid and Campbell - (2557,p22)
Coll: B. C.: Strait of Georgia (2557,p22)

Rhabdostyla commensalis Moebius - (2557,p30)
Coll: B. C.: Departure Bay (2557,p30)
Hab: On polychaete worm *Nereis agassizi* (A.) (2557,p30)

Salpingella acuminata Claparède and Lachmann - (2557,p27)
Coll: B. C.: Strait of Georgia (2557,p27)

Salpingella curta Kofoid and Campbell - (2557,p27)
Coll: B. C.: Departure Bay, July (2557,p27)

Scyphidia (*Rhabdostyla*) *variabilis* (Dons) - (2557,p29)
Coll: B. C.: Saanich Inlet (2557,p29)
Hab: Dredged from 50 fathoms on polychaete worm *Spionophanes cirrata* Sars (2557,p29)

Stenosemella expansa (Wailes) - (2557,p17)
Coll: B. C.: Strait of Georgia, scarce (2557,p17)

Stenosemella inflata Kofoid and Campbell - (2557,p17)
Coll: B. C.: Generally distributed, occasionally numerous (2557,p17)

Stenosemella nivalis (Meunier) - (2557,p18)
Coll: B. C.: Generally distributed, sometimes numerous (2557,p18)

PROTOZOA - CILIATA

Stenosemella pacifica Kofoid and Campbell - (2557,pl8)
Coll: B. C.: Generally distributed, scarce (2557,pl8)

Stenosemella punctata (Wailes) - (2557,pl7)
Coll: B. C.: Generally distributed, sometimes numerous (2557,pl7)

Stenosemella steini (Joergensen) - (2557,pl8)
Coll: B. C.: Generally distributed, not common (2557,pl8)

Stenosemella ventricosa (Claparède and Lachmann) - (2557,pl8)
Coll: B. C.: Generally distributed, sometimes numerous (2557,pl8)

Stentor auriculatus Kahl - (2557,pl0)
Coll: B. C.: Departure Bay, not uncommon (2557,pl0)
Hab: On algae (2557,pl0)

Stentor multiformis O. F. Müller - (2557,pl0)
Coll: B. C.: Gabriola Pass, Departure Bay (2557,pl0)
Hab: On algae, in tide pools, in brackish water and marine (2557,pl0)

Strombidium (Laboea) acuminatum (Leegaard) - (2557,pl2)
Coll: B. C.: Barkley Sound, Departure Bay (2557,pl2)

Strombidium (Laboea) conicum (Lohmann) - (2557,pl2)
Coll: B. C.: West coast of Vancouver Island, Departure Bay (2557,pl2)

Strombidium (Laboea) cornucopiae (Wailes) - (2557,pl2)
Coll: B. C.: West coast of Vancouver Island plankton, not uncommon (2557,pl2)

Strombidium (Laboea) ovale (Leegaard) - (2557,pl2)
Coll: B. C.: Departure Bay, rare (2557,pl2)

Strombidium (Laboea) strobilus (Lohmann) - (2557,pl2)
Coll: B. C.: Quatsino Sound, plankton, rare (2557,pl2)

Strombidium sulcatum Claparède and Lachmann - (2557,pl1)
Coll: B. C.: Strait of Georgia (2557,pl1)
Hab: Among algae and Zostera; not found in plankton (2557,pl1)

PROTOZOA - CILIATA

Thuricola (*Cothurnia*) *valvata* (Wright) - (2557,p36)
Coll: B. C.
Hab: On algae, Bryozoa, not common (2557,p36)

Tiarina fusus Claparède and Lachman - (2557,p5)
Coll: B. C.
Hab: In plankton near shore (2557,p5)

Tintinnopsis bermudensis Brandt - (255 ,pl6)
Coll: B. C.: Off Cape Beal, January; a southern species occasionally carried north (2557,pl6)

Tintinnopsis beroidea Stein, emend. Entz, emend. Joerg. - (2557,pl5)
Coll: B. C.: Generally distributed, not numerous (2557,pl6)

Tintinnopsis coronata Kofoid and Campbell - (2557,pl4)
Coll: B. C.: Strait of Georgia, rare (2557,pl4)

Tintinnopsis cylindrica Daday - (2557,pl4)
Coll: B. C.: Generally distributed, scarce (2557,pl4)

Tintinnopsis karajacensis Brandt - (2557,pl5)
Coll: B. C.: Generally distributed, numerous (2557,pl5)

Tintinnopsis laevigata Kofoid and Campbell - (2557,pl4)
Coll: B. C.: Strait of Georgia and west coast of Vancouver Island, scarce (2557,pl4)

Tintinnopsis minuta Wailes - (2557,pl5)
Coll: B. C.: Strait of Georgia, scarce (2557,pl5)

Tintinnopsis nitida Brandt - (2557,pl6)
Coll: B. C.: Generally distributed, not numerous (2557,pl6)

Tintinnopsis parvula Joergensen - (2557,pl6)
Coll: B. C.: Generally distributed, numerous (2557,pl6)

Tintinnopsis sacculus Brandt - (2557,pl5)
Coll: B. C.: Generally distributed (2557,pl5)

Tintinnopsis strigosa Meunier - (2557,pl6)
Coll: B. C.: Strait of Georgia off Departure Bay (2557,pl6)

PROTOZOA - CILIATA

Tintinnopsis subacuta Joergensen - (2557,pl6)
Coll: B. C.: Strait of Georgia, rare (2557,pl6)

Tintinnopsis wailesi Kofoid and Campbell - (2557,pl5)
Coll: B. C.: Strait of Georgia, west coast of Vancouver Island, rare; also found in a pilchard stomach (2557,pl5)

Tintinnus lusus-undae Entz - (2557,p26)
Coll: B. C.: Generally distributed (2557,p26)

Tintinnus pectinis Kofoid and Campbell - (2557,p26)
Coll: B. C.: Strait of Georgia (2557,p26)

Tintinnus rectus Wailes (emended K. and C.) - (2557,p26)
Coll: B. C.: Generally distributed (2557,p26)

Tintinnus tubulosus Ostenfeld forma laevis Wailes - (2557,p26)
Coll: B. C.

Trachelocera ploenicopterus Cohn - (2557,p4)
Coll: B. C.: Strait of Georgia (2557,p4)
Hab: Among algae and in infusions (2557,p4)

Uronema marinum Dujardin - (2557,p7)
Coll: B. C.
Hab: Among decaying algae, numerous (2557,p7)

Uronychia (Trichoda) transfuga (O. F. Müller) - (2557,p29)
Coll: B. C.: Strait of Georgia (2557,p29)
Hab: Among algae and hydroids (2557,p29)

Vorticella campanula Ehrenberg - (2557,p30)
Coll: B. C.: Strait of Georgia, Departure Bay (2557,p30)
Hab: Worm tubes dredged from 15 fathoms; on algae (2557,p30)

Vorticella marina Greeff - (2557,p30)
Coll: B. C.: Strait of Georgia, Departure Bay float (2557,p30)
Hab: Dredged 10-20 fathoms; on Bryozoa, algae, etc. (2557,p30)

Vorticella microstoma Ehrenberg - (2557,p31)
Coll: B. C.: Strait of Georgia, numerous (2557,p31)

Vorticella patellina O. F. Müller - (2557,p31)
Coll: B. C.: Departure Bay (2557,p31)

Vorticella putrina O. F. Müller - (2557,p31)
Coll: B. C.: Strait of Georgia (2557,p31)
Hab: On algae and diatoms (2557,p31)

Vorticella subsphaerica (Dons) Kahl - (2557,p31)
Coll: B. C.: Strait of Georgia (2557,p31)
Hab: On algae (2557,p31)

Zoothamnium arbuscula Ehrenberg - (2557,p33)
Coll: B. C.: Strait of Georgia (2557,p33)
Hab: On algae, etc., also dredged from 10 fathoms (2557,p33)

Zoothamnium candelabrum Wailes - (2557,p33)
Coll: B. C.: Strait of Georgia near shore, and dredged from 15 fathoms (2557,p33)

Zoothamnium elegans D'Udekem - (2557,p32)
Coll: B. C.: Departure Bay (2557,p32)
Hab: On algae; freshwater and marine (2557,p32)

Zoothamnium niveum Ehrenberg - (2557,p32)
Coll: B. C.: Strait of Georgia (2557,p32)
Hab: Dredged from 10-15 fathoms; on Bryozoa, Hydrozoa and algae in shallow water (2557,p32)

Zoothamnium nutans Claparède and Lachmann - (2557,p32)
Coll: B. C.: Gabriola Pass on algae (2557,p32)

Class: SUCTORIA

Acineta foetida Maupas - (2557,p41)
Coll: B. C.: Hammond Bay, Strait of Georgia (2557,p41)
Hab: On algae dredged from 15 fathoms, usually recorded as occurring among decaying seaweed (2557,p41)

Acineta laevia Dons - (2557,p41)
Coll: B. C.: Departure Bay (2557,p41)
Hab: On red algae, rare (2557,p41)

PROTOZOA - SUCTORIA

Acineta minuta Wailes - (2557,p41)
Coll: B. C.: Departure Bay (2557,p41)
Hab: Epizooic on Copepoda (2557,p41)

Acineta tuberosa Ehrenberg - (2557,p40)
Coll: B. C.
Hab: Generally distributed, occurs on algae, Bryozoa, and crustaceans; collected from beach pools and down to 30 fathoms; plentiful (2557,p40)

Ephelota columbiae Wailes - (2557,p37)
Coll: B. C.: Strait of Georgia (2557,p37)
Hab: Epizooic on crustaceans, occasionally very numerous (2557,p37)

Ephelota coronata Wright - (2557,p37)
Coll: B. C.
Hab: Generally distributed on algae, hydroids, etc., numerous (2557,p37)

Ephelota gemmipara (Hartwig) - (2557,p37)
Coll: B. C.: Strait of Georgia (2557,p37)
Hab: On algae, hydroids, etc., common, found occasionally attached to copepods (Gaidius pungens) and crab zoea (2557,p37)

Ephelota plana Wailes - (2557,p37)
Coll: B. C.: Strait of Georgia near Nanaimo (2557,p37)
Hab: On kelp and other algae, hydroids, etc., numerous in summer of 1924, since then rare (2557,p37)

Ophryocephalus capitatum Wailes - (2557,p40)
Coll: B. C.: False Narrows Reef, Strait of Georgia (2557,p40)
Hab: Epizooic on Ephelota spp. (2557,p40)

Ophryodendron belgicum var. stellatum Wailes - (2557,p39)
Coll: B. C.: Gabriola Pass (2557,p39)
Hab: Dredged from 16 fathoms attached to polychaete worm, Syllis armillaris (2557,p39)

Paracineta crenata Fraipont - (2557,p42)
Coll: B. C.: Koprino Harbour, Quatsino Sound (2557,p42)
Hab: On copepod Microsetella rosea (2557,p42)

PROTOZOA - SUCTORIA

Paracineta crenata var. gracilis Wailes - (2557,p43)
Coll: B. C.: Porlier Pass, Strait of Georgia (2557,p43)
Hab: On hydroids from 25 fathoms (2557,p43)

Paracineta crenata var. pachytheca Collin - (2557,p43)
Coll: B. C.
Hab: In association with var. gracilis (2557,p43)

Paracineta limbata (Maupas) - (2557,p42)
Coll: B. C.: Strait of Georgia (2557,p42)
Hab: On algae, hydroids and Bryozoa, sometimes in numerous colonies (2557,p42)

Paracineta parva Sand - (2557,p42)
Coll: B. C.: Ruxton Pass and Gabriola Pass, Strait of Georgia (2557,p42)
Hab: Dredged from 20 to 30 fathoms on tubes of worm Phyllochaetopterus prolifica (2557,p42)

Paracineta patula Claparède and Lachmann - (2557,p42)
Coll: B. C.: Strait of Georgia (2557,p42)
Hab: On algae, Bryozoa, etc., from tide pools down to 30 fathoms (2557,p42)

Podophyra elongata Claparède and Lachmann - (2557,p39)
Coll: B. C.: Strait of Georgia off Nanaimo at 150 fathoms (2557,p39)
Hab: Epizooic on the copepod Euchaeta japonica (2557,p39)

Radiospermum textum Menier - (2557,p46)
Coll: B. C.: Strait of Georgia in plankton; also off west coast of Vancouver Island, rare (2557,p46)

Trichophrya columbiae Wailes - (2557,p43)
Coll: B. C.: In plankton off Lennard Island, Clayquot Sound, abundant August 7, 1927 (2557,p43)

Trochiscia brachiolata (Moebius) - (2557,p45)
Coll: B. C.
Hab: Generally distributed in plankton; rare (2557,p45)

Trochiscia clevei Lemmermann - (2557,p44)
Coll: B. C.
Hab: Generally distributed, often abundant in plankton.
They provide a common food for larval herring (2557,p44)

PROTOZOA - SUCTORIA

Trochiscia dictyon (Joergensen) - (2557,p45)
Coll: B. C.: Off west coast of Vancouver Island, rare (2557,p45)

Trochiscia moebiusi (Joergensen) - (2557,p45)
Coll: B. C.: Generally distributed (2557,p45)

Trochiscia moebiusi forma - (2557,p45)
Coll: B. C.: Generally distributed, sometimes numerous (2557,p45)

Trochiscia multispinosa (Moebius) - (2557,p44)
Coll: B. C.: Off west coast of Vancouver Island, rare (2557,p44)

Trochiscia multispinosa forma - (2557,p44)
Coll: B. C.: Off west coast of Vancouver Island, rare (2557,p44)

Trochiscia ovata (Pouchet) - (2557,p45)
Coll: B. C.: Off west coast of Vancouver Island, not uncommon (2557,p45)

PHYLUM PORIFERA

The sponges from the outer coasts of the Pacific Northwest have never been reported in detail but biologists in the field generally find that the spectrum of species included in Light's Manual (2033) is similar to those from farther north. Most of the species included in this list are from that source.

Acarnus erithacus de Laub., 1927 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Adocia gellindra (de Laub., 1932) - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Anaata brepha (de Laub., 1930) - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Anaata spongigartina (de Laub., 1930) - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

PORIFERA

Aplysilla glacialis (Dybowski, 1880) - (2033,p20) (2731)
Coll: Ore: Lincoln Co. (2731); intertidal on central Calif. coast (2033,p20) (2731)
Hab: Encrusting, common on underside of overhanging rocks (2731)

Aplysilla polyraphis de Laub., 1930 - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Astylinifer arndti de Laub., 1930 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Carmia macginitiei (de Laub., 1930) - (2033,p19)
Coll: Found on breakwater on Elkhorn Slough (2033,p19)

Clathriopsamma pseudonapya de Laub., 1930 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Cliona celata californiana de Laub., 1932 - (2033,p19)
Coll: Ore: Lincoln Co. (2731); intertidal on central Calif. coast (2033,p19) (2731)
Hab: Boring in $CaCO_3$ substrates

Cliona lobata Hancock, 1849 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Craniella sp. - (2033,p19)
Coll: Undetermined species found at Mission Point, Carmel and Pescadero Point, Monterey Peninsula (2033,p19)

Craniella arb (de Laub., 1930) - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Ectyodoryx parasitica Lambe, 1893 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Esperella adhaerens (Lambe) - (2031,p11)
Coll: Washington (2031,p11)
Hab: Grows on pecten shells (2031,p11)

Esperiopsis originalis de Laub., 1930 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

PORIFERA

Eurypon asodes de Laub. , 1930 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Grantia sp. - (2031,p9)
Coll: Washington
Hab: Solitary form; wharf piles, on stones, tide pools

Halichondria panicea (Pallas, 1766) - (2033,p19) (2731)
Coll: Ore: Lincoln Co. (2731); intertidal on central Calif. coast (2033,p19)

Haliclona lunisimilis de Laub. , 1930 - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Haliclona permollis (Bowerbank, 1866) - (2033,p20)
Haliclona cinera (Grant, 1827)
Coll: Intertidal on central Calif. coast (2033,p20); Ore: (2731)
Hab: Encrusting at higher levels (2731)
Other: Oxidative metabolism (3386); lavender (2731)

Halisarca sacra de Laub. , 1930 - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Homaxinella borealis - (2731)
Coll: Ore: Lincoln Co. (2731)
Hab: Commonly found at tide pool entrances where currents are strong

Hymenampliastra cyanocrypta de Laub. , 1930 - (2033,p19)
Coll: Intertidal on central Calif. coast. (Orange colored variants are sometimes found.) (2033,p19)

Hymeniacidon ungodon de Laub. , 1932 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Isociona lithophoenix (de Laub. , 1927) - (2033,p20) (2731)
Coll: Oregon (2731);intertidal on central Calif. coast (2033,p20)
Hab: Encrusting

Leiosella idia (de Laub. , 1932) - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

PORIFERA

Leuconia heathi (Urban, 1905) - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Leucosolenia eleanor Urban, 1950 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Leucosolenia nautilia de Laub., 1930 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Lissodendoryx noxiosa de Laub., 1930 - (2033,p20) (2731)
Coll: Ore: Lincoln Co. (2731); intertidal on central Calif. coast (2033,p20)
Hab: Dull yellow, young specimens encrusting, older specimens massive (2731)

Microciona microjoanna de Laub., 1930 - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Myxilla parasitica (Lambe) - (2031,p11)
Coll: Washington
Hab: Grows on pecten shells

Ophlitaspongia pennata (Lambe) californiana de Laub., 1932 - (2033,p20) (2731)
Coll: Ore: Lincoln Co. (2731); intertidal on central Calif. coast (2033,p20)
Hab: Encrusting

Papyrula saccharis de Laub., 1930 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Paresperella psila de Laub., 1930 - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Penares cortius de Laub., 1930 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Plocamia karykina de Laub., 1927 - (2033,p20)(2731)
Coll: Ore: Lincoln Co. (2731); intertidal on central Calif. coast (2033,p20)

PORIFERA

Plocamissa igzo (de Laub., 1932) - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Polymastia pachymastia de Laub., 1932 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Reniera rufescens Lambe - (2031,p15)
Coll: Washington
Hab: In crusts, rocks, and stones at waters edge (2031,p15)

Rhabdodermella nuttingi Urban, 1902 - (2033,p19) (2731)
Coll: Intertidal on central Calif. coast (2033,p19)
Hab: Undersides of boulders at low tide level

Sigmadocia edaphus (de Laub., 1930) - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Spheciospongia confoederata de Laub., 1930 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

Stelletta clarella de Laub., 1930 - (2033,p19) (2731)
Coll: Oregon (2731); intertidal on central Calif. coast (2033,p19)

Suberites latus (Lambe) - (2031,p13) (2731)
Coll: Washington
Hab: Subtidal (2031,p13); (hermit sponge); usually found with hermit crab but may be attached to rocks in deep water (2031,p13)

Tedania topsenti de Laub., 1930 - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Tedania toxicalis de Laub., 1930 - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Tedanione obscurata de Laub., 1930 - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Tethya aurantia californiana de Laub., 1932 - (2033,p19)
Coll: Intertidal on central Calif. coast (2033,p19)

PORIFERA

Toxadocia sp. - (2731)
Coll: Ore: Lincoln Co. (2731)

Xestospongia vanilla (de Laub., 1930) - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

Zygherpe hyaloderma de Laub., 1932 - (2033,p20)
Coll: Intertidal on central Calif. coast (2033,p20)

PHYLUM COELENTERATA (CNIDARIA)

Class: HYDROZOA
Order: A. Hydroida
Suborder: Calyptoblastea (Leptomedusa)

Abietinaria spp. - (2033,p33)
Coll: Oregon (2052,p33), 10-110 (3003); Calif: intertidal (2033,p33)

Abietinaria abietina (Linnaeus, 1758) - (2033,p33)
Dist: Bering Sea to San Diego, Calif. (2052,p24)
Coll: Ore: Newport 55-104m (2052,p24,33), 55-104 (3003); Calif: intertidal on central coast (2033,p33)

Abietinaria alexanderi Nutting, 1904 - (3003,p7)
Coll: Oregon, 10m (3003,p7)

Abietinaria amphora Nutting, 1904 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Abietinaria anguina (Trask, 1857) - (2033,p33)
Dist: Queen Charlotte to San Quitin Bay (2052)
Coll: Ore: Newport (2052), Heceta Head (2052); Calif: central (2033,p33)

Abietinaria filicula (Ellis and Solander) - (2031,p21)
Dist: Puget Sound (2031,p21) to central Calif. (2033)
Hab: Shore attached to pilings, rocks, and shells (2031,p21)

Abietinaria greenei (Murray, 1860) - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

COELENTERATA - HYDROZOA - Calyptoblastea

Abietinaria pacifica Stechow, 1923 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Abietinaria traski (Torrey) - (2052,p33)
Dist: Berg Inlet, Alaska to San Diego (2338,pl43) (9-400m)
Coll: Ore: Newport (2052,p33) (46-400m) (3003)

Acryptolaria sp. - (3003,p7)
Coll: Ore: (3003,p7) (77m), Newport (2052,p33)

Aequorea sp. Peron and Lesueur, 1809 - (2033,p39)
Coll: Friday Harbor to Oregon (2033,p39) (2041); luminescent (2033,p39)

Aequorea aequorea (Forakali) - (2031,p33)
Dist: Puget Sound (2031,p33) to central Calif. (2033,p39)
Hab: Pelagic near docks

Aglaophenia sp. - (2052,p33)
Coll: Ore: Newport (2052,p33) (10-400m); Calif: central coast (2033,p33)
Hab: Intertidal (2033,p33), 55-138m (3003)

Aglaophenia diegensis Torrey, 1904 - (2033,p33)
Dist: Newport to Santa Maria Bay and Galapagos (2052,p29)
Coll: Ore: Newport 0-110m (3003), (2052,p30); Calif: intertidal on central Calif. coast (2033,p33)

Aglaophenia inconspicua Torrey - (2052,p33)
Coll: Ore: Newport (77m) (3003),(2052,p33) to Baja, Calif. (2338,pl44) (0-154m)

Aglaophenia latirostris Nutting, 1900 - (2033,p33)
Coll: Intertidal on central Calif. coast. If ripe will produce planulae readily when left in sun for approximately an hour (2033,p33)

Aglaophenia lophocarpa Allman, 1877 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Aglaophenia octocarpa Nutting, 1900 - (3003,p7)
Coll: Oregon (92m) (3003,p7)

COELENTERATA - HYDROZOA - Calyptoblastea

Aglaophenia struthionides (Murray, 1860) - (2033,p33)
Dist: Puget Sound (2031,p23) to central Calif. coast (2033,p33)
Hab: Intertidal (2033,p33)

Calycella syringe (Linnaeus, 1767) - (2033,p33)
Coll: Intertidal on central Calif. coast. (2033,p33)

Campanularia dentriculata Clark, 1876 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Campanularia fusiformis Clark, 1876 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Campanularia gelatinosa (Pallas, 1766) - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Campanularia urceolata Clark, 1876 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Campnaularia verticillata (Linnaeus) - (2052,p33)
Dist: Bering Sea to San Diego and Chile 13-869m (2338,p143)
Coll: Ore: Newport (2052,p33) 77m (3003)

Campnaularia volubilis (Linnaeus, 1767) - (2033,p33)
Coll: Ore: Newport, 10m (3003); intertidal on central Calif. coast (2033,p33)

Campanulina forskalea (Peron et Leseur, 1809) - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Clytia spp. - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Clytia bakeri Torrey, 1904 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Clytia edwardsi (Nutting, 1901) - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Clytia hendersoni Torrey, 1904 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Egmundella gracilis Stechow - (2052,p33)
Dist: Rose Harbour Queen Charlotte Is. to San Francisco Bay 13-800m (2338,p143)
Coll: Ore: Newport (2052,p33)

COELENTERATA - HYDROZOA - Calyptoblastea

Eucopella spp. - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Eucopella caliculata (Hincks, 1853) - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Eucopella compressa (Clark, 1876) - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Eucopella everta (Clark, 1876) - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)
Hab: Abundant on kelp (2033,p33)

Eutonia Hartlaub. 1897 - (2033,p39)
Coll: Intertidal on central Calif. coast (2033,p39)
Hab: Very common at times, has generally been identified as Eutimium (2033,p39)

Gonothyraea clarki (Marktanner-Turneretscher, 1895) - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Halecium spp. - (2033,p33)
Coll: Ore: Newport, 92m (2052,p19)
Hab: Intertidal (2033,p33)

Halecium annulatum Torrey, 1902 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Halecium corrugatum Nutting, 1899 - (2033,p33)
Dist: Alaska to lower Calif. (2052,p20)
Coll: Ore: Newport, 0-110m (2052,p20) 55m (2033); Calif: intertidal on central coast (2033,p33)

Halecium tenellum Hincks, 1861 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Halistaura cellularia (Agassiz, 1865) - (2033,p39)
Dist: Alaska to Calif. (2033,p39)
Coll: Puget Sound (2031,p31); Oregon (2341); Calif: (2033,p39)
Hab: Pelagic

COELENTERATA - HYDROZOA - Calyptoblastea

Hydrallmania distans Nutting, 1899 - (2053,p33)
Dist: Queen Charlotte Is. to San Diego 6-400m (2338,pl43)
Coll: Ore: Newport (2052,p33) 6-400m (2052,p26); Calif: central coast (2033,p33)
Hab: Intertidal (2033,p33)

Lafoea adnata Fraser, 1925 - (2052,p33)
Dist: Newport, Oregon to Farallon Is., Calif. (2388,pl43) 60-92m
Coll: Ore: Newport (2052,p33), 65-92m (3003,p7)

Lafoea dumosa (Fleming) - (2052,p33)
Dist: Bering Sea to Bulf of Calif. 9-823m (2338,pl43)
Coll: Ore: Newport (2052,p33),77m (3003)

Lafoea fruticosa (M. Sars) - (2052,p33)
Dist: Bering Sea to San Francisco Bay, Calif. (6-1829m) (2330,pl4)
Coll: Ore: Newport (2052,p33), 64m (3003)

Lafoea gracillima (Alder) - (2052,p33)
Dist: Bering Sea to No. Ecuador 6-957m (2338,pl43)
Coll: Ore: Newport (2052,p33), 64-400m (3003)

Laodicea sp. Lesson, 1843 - (2033,p39)
Coll: Intertidal on central Calif. coast (2033,p39)

Obelia spp. - (2033,p33)
Coll: Newport, Oregon (400m) (2052,pl8); intertidal on central Calif. coast (2033,p33)

Obelia bicuspidata Clarke, 1876 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Obelia commissuralis McCrady, 1858 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Obelia dichotoma (Linnaeus) 1758
Coll: Puget Sound (2031) ; central Calif. (2033,p33)
Hab: Wharf piling, rocks, seaweed, and floating timber

Obelia dubia Nutting, 1901 - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

COELENTERATA - HYDROZOA - Calyptoblastea

Obelia geniculata (Linnaeus, 1767) - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Obelia longissima (Pallas, 1766) - (2033,p33)
Coll: Intertidal on central Calif. coast (2033,p33)

Obelia plicata Hincks, 1868 - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

Plumularia spp. - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

Plumularia alicia Torrey, 1902 - (2033,p34)
Dist: Yaquina Bay, Oregon to So. Bay, Cerros Is. Lower Calif. (2052,p31)
Coll: Ore: Newport, 0-329m (2052,p31), 22m (3003,p31); Calif. central (2033,p34)

Plumularia goodei Nutting, 1900 - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

Plumularia lagenifera Allman, 1885 - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

Plumularia plumularoides (Clark, 1876) - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

Plumularia setacea (Ellis, 1755) - (2033,p34)
Coll: Intertidal, central Calif. coast (2033,p34)

Sertularella spp. - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

Sertularella pinnata Clark, 1876 - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

Sertularella rugosa (Linnaeus, 1758) - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

COELENTERATA - HYDROZOA - Calyptoblastea

Sertularella turgida (Trask, 1847) - (2033,p34)
Dist: Queen Charlotte Island to Baja Calif., 0-200m (2338,pl43)
Coll: Ore: Newport, 0-200m, Heceta Head (2052,p27), 64-200m (3003); Calif: intertidal on central coast (2033,p34)

Sertularia spp. - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

Sertularia cornicina McCrady, 1858 - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

Sertularia desmoides Torrey, 1902 - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

Sertularia furcata Trask, 1857 - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34)

Suborder: Gymnoblasta

Bimeria franciscana Torrey, 1902 - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32)

Bougainvillia mertensi Agassiz, 1862 - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32)

Calycopsis namatophora Bigelow - (2341)
Coll: Oregon (2341)

Campanularia sp. - (2052,p53)
Coll: Ore: Newport (2052,p33), 10m (2338) (3003), 400m epizoic (2052,pl6); Calif: central coast (2033,p33)
Hab: Intertidal (2033,p33)

Candelabrum sp. - (2003,p32)
Coll: From low intertidal at Pigeon Point (2033,p32)

•*Cladonema californica* Hyman, 1947 - (2033,p39)
Dist: Monterey Bay to Tomales Bay, Calif. (2033,p39)

COELENTERATA - HYDROZOA - Gymnoblasta

Eudendrium sp. - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32)

Eudendrium californicum Torrey, 1902 - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32)

Eudendrium tenellum Allman - (2052,p33)
Dist: Alaska to Columbia 0-479m (2338,p143)
Coll: Ore: Newport (2052,p33)

Garveia annulata Nutting, 1901 - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32)

Hybocodon prolifera (Agassiz, 1862) - (2553,p11)
Coll: British Columbia (2553,p11)
Remarks: Surface rare, summer (2553,p11)

Hydractinia spp. - (2033,p32)
Coll: Ore: Newport 0-300m (2052,p33); central Calif. coast (2033,p32)
Hab: Intertidal (2033,p32)

Hydractinia laevispina Fraser, 1922 - (2033,p32)
Coll: Off Coast Guard breakwater in Monterey Harbor (2033,p32)
Hab: On kelp (2033,p32)

Hydractinia milleri Torrey, 1902 - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32)

Perigonimus repens (Wright) 1858 - (2052,p33)
Dist: Admiralty Is., Alaska to Ecuador and the Galapagos, 16-914m (2338,p143)
Coll: Ore: Newport (2052,p33)
Hab: Epizoic on *Acila castrensis* and *Nassarius fossatus* and *Collus halli*, sand bottom (2052,p13)

Phialidium gregarium Agassiz - (2031,p29)
Dist: Puget Sound (2031,p29) to Monterey Bay, rare (2033,p39)
Hab: Pelagic

Polyorchis (*Scrippsia*) *pacifica* (Torrey, 1909) - (2033,p39)
Coll: Calif: San Francisco Bay to Monterey Bay (2033,p39)

COELENTERATA - HYDROZOA - Gymnoblasta

Polyorchis penicillatus (Eschscholtz, 1829) - (2033,p39)
Synonym: P. penicillata in (2031,p37)
Dist: Puget Sound (2031,p37) to San Francisco Bay, Calif. (2033,p39)
Hab: Pelagic

Proboscidactyla sp. - (2033,p32)
Coll: Calif: central coast (2033)
Hab: Found in Monterey area on tubes of Pseudopotamilla ocellata and P. intermedia (2033,p32)

Proboscidactyla flavicirrata Brandt, 1834 - (2033,p32)
Coll: B. C.: (2553,pl2); Friday Harbor, Wash. to central Calif. coast (2033,p32)
Hab: On tube of Schizobranchis, Pseudopotamilla (2033,p32)
Remarks: Surface, common, summer (2553,pl2)

Rathkea octopunctata (M. Sars, 1835) - (2553,pl1)
Coll: British Columbia (2553,pl1)
Remarks: Surface, rare, summer (2553,pl1)

Sarsia mirabilis L. Agassiz - (2031,p25)
Dist: Puget Sound (2031) to central Calif. (2033)
Hab: Pelagic

Stomotoca L. Agassiz, 1862- (2033,p39)
Coll: Intertidal on central Calif. coast (2033,p39)

Stomotoca atra Agassiz - (2031,p27)
Dist: Puget Sound (2031) to central Calif. (2033,p39)
Hab: Pelagic

Syncoryne eximia (Allman, 1859) - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32)

Syncoryne mirabilis (Agassiz, 1862) - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32)

Tubularia crocea (Agassiz, 1862) - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32); abundant on Fruitvale Bridge, Oakland, in summer (2033,p32)

Tubularia marina Torrey, 1902 - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32)

Turris neglecta Lesson, 1843 - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32)

Turritopsis nutricula McCrady, 1857 - (2033,p32)
Coll: Intertidal on central Calif. coast (2033,p32)

Order: Milleporina

Allopora porphyra (Fisher, 1931) - (2033,p34)
Coll: Intertidal on central Calif. coast (2033,p34), encrusting

Order: Trachylina

Aegina citria Eschscholtz, 1829 - (2553,pl2)
Aegina citrea - (2341)
Coll: British Columbia (2553,pl2), Oregon (2341)
Remarks: Deep, common, all year (2553,pl2)

Aeginutra grimaldii Mass - (2341)
Coll: Oregon (2341)

Aglantha digitale Muller, 1766 - (2553,pl2)
Coll: British Columbia (2553,pl2), Oregon (2341)
Remarks: Deep, common, summer (2553,pl2)

Botrynema brucei Browne - (2341)
Coll: Oregon (2341)

Colobonema serviceum Vanhoffen - (2341)
Coll: Oregon (2341)

Crossota rufobrunnea (Kramp) - (2341)
Coll: Oregon (2341)

COELENTERATA - HYDROZOA - Trachylina

Cunina octonaria McCrady - (2341)
Coll: Oregon (2341)

Gonionemus vertens A. Agassiz 1862 - (2031,p35)
Dist: Puget Sound (2031,p35) to central Calif. (2033,p39)
Hab: Pelagic, among Zostera

Halicreas minimum Fewkes - (2341)
Coll: Oregon (2341)

Pantachogon haeckeli Mass - (2341)
Coll: Oregon (2341)

Solmissus incisa (Fewkes) - (2341)
Coll: Oregon (2341)

Solmissus marshalli Agassiz and Mayer - (2341)
Coll: Oregon (2341)

Vallentinia adherens Hyman, 1947 - (2033,p39)
Coll: Off Hopkins Marine Station, Monterey Bay, Calif. (2033,p39)
Hab: Common on Macrocystis (2033,p39)

Order: Siphonophora

Bargmannia sp. - (2341)
Coll: Oregon (2341)

Chelophyes appendiculata (Eschscholtz) - (2341)
Coll: Oregon (2341)

Chuniphyes moserae Totton - (2341)
Coll: Oregon (2341)

Chuniphyes multidentata Lens and van Riemsdijk - (2341)
Coll: Oregon (2341)

Diphyes sp.
Coll: Washington (2031)
Hab: (deep water form) pelagic (2031,p39)

COELENTERATA - HYDROZOA - Siphonophora

Lensia conoidea (Kefferstein and Ehlers) - (2341)
Coll: Oregon (2341)

Muggiaea atlantica Cunningham - (2341)
Coll: Oregon (2341)

Nanomia bijuga Chiaje, 1841 - (2553,p17)
Coll: British Columbia; Wash: Oak Bay and Friday Harbor (2553,p17)

Nanomia cara A. Agassiz, 1865 - (2553,p17)
Coll: B. C. (2553,p17); Wash: Friday Harbor, Oak Bay, Sidney Island (2553,p17); Oregon (2341)

Physophora hydrostatica Forskal - (2341)
Coll: Oregon (2341)

Praya dubia (Quoy and Gaimard) - (2341)
Coll: Oregon (2341)

Praya reticulata (Bigelow) - (2341)
Coll: Oregon (2341)

Sulculeolaria quadrivalvis Blainville - (2341)
Coll: Oregon (2341)

Velella lata Chamisso and Eysenhardt - (2031,p41)
Dist: Puget Sound to central Calif. (2033,p23)
Hab: Pelagic (2033,p23)

Velella velella (L.) - (2341)
Coll: Oregon (2341)

Vogita spinosa Kefferstein and Ehlers - (2341)
Coll: Oregon (2341)

Class: SCYPHOZOA

Allopora verrilli Dall, 1884 - (3003,p8)
Coll: Oregon 92m (3003,p8)

COELENTERATA - SCYPHOZOA

Aquorea aquorea (Forsakali) - (3804,pl00)
- Coll: B. C. (3804,pl00); Calif: (2033)
- Hab: Conspicuous around floats, wharves, face current drift (3804,pl00)
- Food: Small fish (3804,pl00)

Atolla vanhoeffeni Russel - (2341)
- Coll: Oregon (2341)

Atolla wyvillei Haeckel - (2341)
- Coll: Oregon (2341)

Aurellia aurita (Linnaeus) - (2033,p41, 45)
- Aurelia (2033,p41)
  - Dist: Puget Sound to central Calif. (2033,p41)
  - Hab: Pelagic

Aurellia labiata Chamisso and Eysenhardt, 1820 - (2033,p41) (3804,pl01)
- Dist: B. C. to central Calif. (2033,p41) (3804,pl01)
- Hab: Pelagic in Ore. (2341); intertidal in Calif. (2033,p41); noticeable in bays and arms where trapped (3804,pl01)
- Life cycle: Vegetative stage found on solid support; adult: free swimming (3804,pl01)

Chrysaora melanaster Brandt, 1838 - (2033,p41)
- Coll: Intertidal on central Calif. coast (2033,p41)

Cyanea capillata Eschscholtz - (3804,pl02) (2031,p43)
- C. capillata Linnaeus, 1746 - (2033,p41)
  - Dist: B. C. to central Calif. (2033,p41) (3804,pl02)
  - Coll: Puget Sound, pelagic (2031,p43); taken in 7-12.5 fms off Oregon in trawl (3412)
  - Hab: Along coastline drifting with tide, found inshore and far out (3804,pl02)
  - Misc.: Stinging cells contain several toxins, irritate human skin (3804,pl02)

Euplexaura marki Kukenthal, 1912 - (3003,p8)
- Coll: Oregon 64-200m (3003,p8)

COELENTERATA - SCYPHOZOA

Haliclystus sanjceanensis - (2031,p47)
Coll: False Bay, Puget Sound (2031) (2033)
Hab: Attached to eel grass or other sea weed (2031,p47)

Lieoptilus quadriangularis (Moroff, 1902) - (2003,p8)
Coll: Oregon 50-86m (3003,p8)

Metridium sp. - (3003,p8)
Coll: Oregon, 100m (3003,p8)

Oncosoecia sp. - (3003,p8)
Coll: Oregon, 95m (3003,p8)

Paraphyllina ransoni Russel - (2341)
Coll: Oregon (2341)

Pelagia panopyra (Peron and Lesueur, 1807) - (2033,p41)
Coll: Intertidal on central Calif. coast (2033,p41)

Periphylla periphylla (Peron and Lesueur) - (2341)
Coll: Oregon (2341)

Phacellophora camtschatica Brandt, 1838 - (2033,p41)
Coll: Intertidal on central Calif. coast (2033,p41)

Class: ANTHOZOA

Aiptasiomorpha luciae (Verrill, 1899) - (2744,p49)
Dist: From Japan and Alaska to southern Calif. (2744,p49)
Coll: Oregon (2744,p49)
Hab: Occurs abundantly on rocks, broken shells, piling and oysters in larger bays of Oregon (2744,p49)

Anthopleura xanthogrammica (Brandt, 1835) - (2744,p15)
Cribrina xanthogrammica
Dist: Abundant from Oregon to southern Calif. and Japan (2744,p16)
Hab: Occurs from upper littoral to sub-littoral on rocky shores, is also present in bays on piling (2744,p16)

COELENTERATA - ANTHOZOA

Balanophyllia elegons Verrill, 1864 - (2031,p53)
Dist: Puget Sound to central Calif. (2033) (2031)
Coll: Ore: Newport, 100m (2003,p8)
Remark: This is the only northwest Pacific coral (2031,p53)

Bunodactis elegantissima (Brandt, 1835) - (2744,p19)
Dist: Abundant along entire coast from Sitka, Alaska to southern Calif. (2744,p20)
Coll: Oregon (2744,p20)
Hab: Always found in colonies on rocks or piling of open coast or bays. Occurs primarily in upper littoral regions (2744,p20)

Cribrina xanthogrammica (Brandt)
See *Anthopleura xanthogrammica*

Diadumene sp. (Cuttress, 1949) - (2744,p45)
Coll: Found along entire Oregon coast (2744,p45)
Hab: Occurs intertidally and sub-tidally, in colonies firmly attached to rocks and piling in bays (Cuttress never found this anemone on open coast) (2744,p45)

Epiactis sp. (Cuttress, 1949) - (2744,p29)
Coll: Oregon (from Astoria to Brookings) (2744,p29)
Hab: Southern form occurs intertidally on rocks of open coast. Northern form occurs sub-tidally on rocks and epizoically on Pecten and Cancer (2744,p29)

Epiactis prolifera Verrill 1869 - (2744,p26) (2031,p59)
Dist: B. C. to southern Calif. (2744,p26)
Coll: Puget Sound (2031); Oregon (2744,p26); central Calif. (2033,p46)
Hab: Intertidal, attached firmly to rocks on open coast. Occurs from upper littoral to sub-littoral (2744,p26); bottom of tide pools, eel grass (2031,p59)

Epiactis artemisia (Dana 1849) - (2744,p23)
Dist: Alaska to northern Calif. (2744,p23)
Coll: Oregon, entire coast (2744,p23)
Hab: Occurs from upper littoral to sub-littoral on open coast and in bays. Almost always found firmly attached in holes in rocks with only tentacles protruding. Attains much larger size in bays (2744,p23)

COELENTERATA - ANTHOZOA

Halcampa duodecimcirrata (Sars 1851) - (2744,p12)
Dist: Pysht, Washington to southern Calif. (2744,p12)
Coll: Ore: Coos Bay (2744,p12)
Hab: Adults are found buried in sand and finely broken shell in tide pools among the rocks. Generally animals are completely covered but on cloudy days disc and tentacles are frequently visible. Often found in association with *Leptosynapta*. Larva parasitic on medusae (2744,p12)

Metridium marginatum Ellis - (2031,p55)
Coll: Puget Sound (2031)
Hab: Deep water (orange and yellow), rocks and wharf piles (white) (2031,p55)

Metridium senile (Linnaeus 1767) - (2744,p38)
Coll: Oregon coast (2744,p38)

Metridium senile dianthus Oken 1815 - (2744,p39)
Dist: Boreal and circumpolar (2744,p39)
Coll: Common on Oregon coast (2744)
Hab: Occurs subtidally and rarely intertidally; found attached to rocks and piling of open coast and larger bays (2744,p39)

Metridium senile fimbriatum Verrill 1865 - (2744,p40)
Dist: Alaska to northern Calif. (2744,p41)
Coll: Entire Oregon coast (2744)
Hab: Lower littoral to sub-littoral on open coast; occurs firmly attached in holes or to undersurfaces of rocks (2744,p41)

Peachia quinquecapitata McMurrich 1913 - (2744,p9)
Coll: B. C.: Departure Bay, Vancouver Island; Wash: Friday Harbor; Ore: Coos Bay (2744,p9)
Hab: Occur mostly subtidally; many larvae taken in Coos Bay were attached to subumbrellar surfaces of hydroid medusae, *Phialidium gregarium* (2744,p9)

Ptilosarcus quadrangularis Moroff - (2031,p49)
Coll: Puget Sound (2031,p49)
Hab: Deep water (2031,p49)

COELENTERATA - INCERTAE SEDIS

Stylatula elongata (Gabb) - (2031, p51)
Dist: Puget Sound to central Calif. (2031) (2033)
Coll: Ore: Newport 165-190m (3003, p8)
Hab: Lower end buried (subtidal) (2031, p51)

Tealia felina (Linne 1767) - (2744, p32)
Dist: Alaska to northern Calif., boreal (2744, p32)
Coll: Common on Oregon coast (2744, p32)
Hab: Occurs from upper littoral to sub-littoral on rocks of open coast and bays (2744, p32)

Tealia felina coriacea - (2744, p34)
Dist: Common from Alaska to northern Calif., boreal (2744, p32)
Coll: Oregon (2744, p32)
Hab: Lives buried in gravel and shell under rocks (2744, p34)

Tealia felina crassicornis - (2744, p33)
Dist: Alaska to northern Calif., boreal (2744, p32)
Coll: Oregon (2744, p32)
Hab: Occurs fromupper littoral to sub-littoral on rocks of open coast and bays (2744, p32)

Tealia felina lofotensis - (2744, p34)
Dist: Occurs from Alaska tonorthern Calif., boreal (2744, p32)
Coll: Ore: deep water form but rarely occurs intertidally (2744, p34)

Class: INCERTAE SEDIS

Dimophyes arctica Chun, 1897 - (2553, p17)
Coll: B. C. region (2553, p17)
Remarks: Deep, common, all year (2553, p17)

Lensia baryi Totton, 1965 - (2553, p17)
Coll: B. C. (2553, p17); type specimen from Burke Channel (2553, p17)
Remarks: Deep, rare, spring and summer

PHYLUM CTENOPHORA

Beroe cucumis Fabricus, 1780 - (2033,p48)
Coll: Oregon (2341); central Calif. coast (2033,p48)
Hab: Intertidal (2033,p48)

Beroe forskalii Milne-Edwards 1841 - (2031,p63)
Coll: Puget Sound (2031,p63); central Calif. (2033,p48)
Hab: Pelagic

Bolinopsis infundibulum (Muller, 1776) - (2553,p20)
Coll: British Columbia region (2553,p20)
Remarks: Surface, abundant. This is a fragile species which disintegrates in a plankton net. Observed in shallow water of Departure Bay and Long Harbour in spring of 1967 (2553,p20)

Bolinopsis microptera (A. Agassiz, 1865) - (2033,p48)
Coll: Intertidal on central Calif. coast (2033,p48)

Euplokamis californiensis Torrey, 1904 - (2033,p48)
Coll: Intertidal on central Calif. coast (2033,p48)

Hormiphora sp. - (2033,p48)
Coll: Intertidal on central Calif. coast (2033,p48)

Leucothea sp. - (2033,p48)
Coll: Intertidal on central Calif. coast (2033,p48)

Mertensia ovum (Fabricius, 1780) - (2033,p48)
Coll: Intertidal on central Calif. coast (2033,p48)

Pleurobrachia bachei A. Agassiz - (2031,p61)
Coll: Puget Sound (2031); central Calif. (2033,p48)
Hab: Pelagic

Pleurobrachia pileus (Muller) - (2341)
Coll: Oregon (2341)

PHYLUM PLATYHELMINTHES

Class: TURBELLARIA

Acerotisa alba (Freeman) 1933 - (2998,p378)
Coll: Puget Sound (2998,p378)
Hab: On hydroids at old marine station (2998,p378)

Alloioplana californica (Heath and McGregor, 1912) - (2033,p53)
Coll: Intertidal on central Calif. coast (2033,p53)

Childia groenlandica (Levinsen, 1879) - (3503,p2)
Syn: C. spinosa Graff, 1911; C. altica Luther, 1912
Dist: Possibly circumpolar and circumboreal, south to San Francisco Bay (3502,p5)

Cryptophallus magnus Freeman - (2031,p67)
Coll: Washington (2031)
Hab: Attached to rocks, can swim (2031,p67)

Diatomovora amoena - (2997,p161)
Coll: South Slough at Charleston, Ore. (43°20.4'N, 124°19.5'W)
Hab: In washings of Ulva and Enteromorpha taken from muddy sand (2997,p161)

Eurylepta aurantiaca Heath and McGregor, 1912 - (2033,p53)
Dist: Vancouver Island to San Diego region (2998,p372)
Coll: Wash: Clayoquot, Round Island (2998,p372), Peavine Pass, Puget Sound dredged at 40m (3504,p10); intertidal on central Calif. coast (2033,p53)

Eurylepta leoparda Freeman, 1933 - (2998,p372)
Coll: Puget Sound (2998,p388)

Freemania litoricola (Heath and McGregor, 1912) - (2033,p53)
Coll: B. C.: Vancouver Island, Queen Charlotte Islands (2998,p337)
Wash: Puget Sound (2998,p337); central Calif. coast (2033,p53)
(2033,p53)
Hab: Intertidal (2033,p53)

PLATYHELMINTHES - TURBELLARIA

Kaburakia excelsa Bock, 1925 - (2033,p53)
Dist: Sitka, Alaska to central Calif. coast (2033,p53)
Coll: B. C.: Along shore of Vancouver Island (2998,p291); Wash: Puget Sound (2998,p291)
Hab: Rocky shores, under rocks, sluggish (2998,p291)

Leptoplana chloranota (Boone, 1929) - (2033,p54)
Dist: Puget Sound, B. C. to central Calif. coast (2033,p54) (2998,p311)
Hab: Intertidal (2033,p54); littoral, under stones (2998,p311)

Leptoplana vesiculata Hyman, 1939 - (2998,p388, 313)
Coll: Puget Sound (2998,p388)

Notoplana acticola (Boone, 1929) - (2033,p54)
Coll: Intertidal on central Calif. coast (2033,p54)

Notoplana celeris Freeman, 1933 - (2998,p329)
Coll: Puget Sound (2998,p330)

Notoplana inquieta (Heath and McGregor, 1912) - (2033,p54)
Dist: Puget Sound, B. C. (2998,p320) to central Calif. coast (2033,p54)
Hab: Intertidal (2033,p54)

Notoplana inquilina, Hyman - (3504,p1)
Coll: Wash: Cowlitz Bay, Waldron Island, Puget Sound (3504,p2)
Hab: On inner surface of shells containing hermit crabs taken at 8-16m (3504,p2)

Notoplana longastyletta (Freeman, 1933) - (2033,p54)
Dist: Puget Sound (2998,p327) to central Calif. coast (2033,p54)
Hab: Intertidal (2033,p54)

Notoplana natans Freeman, 1933 - (2033,p54)
Dist: Puget Sound (2998,p329) to central Calif. coast (2033,p54)
Coll: Wash: Olga, False Bay at Orcas Island, Turn Rock (2998,p329)
Hab: Intertidal (2033,p54)

Notoplana rupicola (Heath and McGregor, 1912) - (2033,p54)
Coll: Cape Kiwanda, Oregon, 50 fms (2998,p317); central Calif. coast, intertidal (2033,p54)

PLATYHELMINTHES - TURBELLARIA

Notoplana sanguinea Freeman, 1933 - (2033,p54)
Coll: Wash: Puget Sound near Olga, Turn Rock (2998,p328); central Calif. coast (2033,p54)
Hab: Intertidal (2033,p54)

Notoplana sanjuania Freeman, 1933 - (2033,p54)
Coll: Alaska (2998,p332); Puget Sound (2998,p332); Central Calif. coast (2033,p54)
Hab: Intertidal (2033,p54)

Notoplana saxicola (Heath and McGregor, 1912) - (2033,p54)
Coll: Central Calif. coast (2033,p54)
Hab: Intertidal (2033,p54)

Plehnia caeca Hyman, 1953 - (2033,p53)
Coll: Intertidal on central Calif. coast (2033,p53)

Phylloplana viridis (Freeman) 1933 - (2998,p334)
Coll: Wash: Puget Sound at False Bay (2998,p334)

Polychoerus carmelensis Costello and Costello, 1938 - (2033, p53)
Coll: Monterey peninsula (2033,p53)
Hab: Abundant on Ulva and stones in high tide pools; excellent for class study (2033,p53)

Pseudoceros canadensis Hyman, 1953 - (2033,p53)
Coll: B. C.: Clayoquot (2998,p368); Wash: Puget Sound, crawling on Ulva and eelgrass (3504,pl0); central Calif. coast (2033,p53)

Pseudoceros luteus (Plehn, 1898) - (2033,p53)
Coll: Central Calif. coast (2033,p53)
Hab: Intertidal (2033,p53)

Pseudoceros montereyensis Hyman, 1953 - (2033,p53)
Coll: Intertidal on central Calif. coast (2033,p53)

Pseudostylochus burchami (Heath and McGregor) 1912 - (2998,p358)
Dist: Puget Sound south into Mexican waters (2998,p359)
Coll: Ore: Depoe Bay, trawled (2998,p359); Calif: intertidal on central coast (2033,p54)

Pseudostylochus ostreophagus, Hyman - (3504,p4)
Coll: Puget Sound (3504,p4)
Hab: Preying on Ostrea lurida (3504,p4)

PLATYHELMINTHES - TURBELLARIA

Stylochoplana gracilis Heath and McGregor, 1912 - (2033,p54)
    Coll: Intertidal on central Calif. coast (2033,p54)

Stylochus atentaculatus Hyman, 1953 - (2033,p54)
    Dist: Oregon to Lower Calif., more common in northern part of its range (2998,p285)
    Coll: Ore: Charleston, intertidal zone; Cape Arago State Park (2998,p285); Calif: (2033,p54)

Stylochus californicus Hyman, 1953 - (2033,p54)
    Coll: Intertidal on central Calif. coast (2033,p54)

Stylochus exiguus Hyman, 1953 - (2033,p54)
    Coll: Intertidal on central Calif. coast (2033,p54)

Stylochus franciscanus Hyman, 1953 - (2033,p54)
    Coll: Intertidal on central Calif. coast (2033,p54)

Stylochus tripartitus Hyman, 1953 - (2033,p54)
    Dist: Oregon to lower end of Lower Calif. (2998,p283)
    Coll: Ore: Fossil Point, Coos Bay (2998,p283); Calif: intertidal (2033,p54)

Syndesmis dendrastrorum Stunkard and Corliss, 1951 - (2033,p53)
    Coll: La Jolla, Calif. (2033,p53)
    Hab: Reported from intestine of sand dollar Dendraster at La Jolla (2033,p53)

Syndesmis franciscana (Lehman, 1946) - (2033,p53)
  Syndesyrinx franciscana - (2032)
    Coll: Oregon; central Calif. coast (2033,p53)
    Hab: Common in intestines of sea urchins Strongylocentrotus (good class material) (2033,p53)
    Other: Histology (2089)

PLATYHELMINTHES - TREMATODA - Monogenea

Class: TREMATODA
Order: Monogenea

Megalocotyle trituba Pratt and Aldrich, 1953 - (3017,p6)
Coll: Ore: Lincoln Co. (3019,p6)
Hab: Parasite of *Sebastodes paucispinus*, *S. alutus*, *S. diploproa*, *S. pinniger*, and *S. ruberrimus* (3017)

Microcotyle sebastis Goto, 1894 - (3019,p9)
Coll: Washington, Oregon (3019,p9)
Hab: Parasite of *Sebastodes maliger*, *S. melcnops*, *S. caurines*, and *Ophiodon elongatus* (3019)

Nitzchia quaditestes Pratt and Hermann, 1962
Coll: Off mouth of Columbia River in Pacific Ocean and upstream to vicinity of Rainier, Oregon (3400)
Hab: Parasite of *Acipenser transmontanus* Richardson and rarely *Acipenser medirostris* Ayres

Order: Digenea

Accacladocoelium macrocotyle (Diesing, 1858) Odhner, 1928 - (3019,p13)
Coll: Ore: Pacific Oecan off Newport (3019,p13)
Hab: Parasite of *Mola mola* (3019)

Bucephalopsis ozakii (Ozaki, 1928) Nagaty, 1937 - (3019,p19)
Coll: B. C.; Ore: Lincoln Co. (3019,p19)
Hab: Parasite of *Salvelinus malma*, *Platyichthys stellatus*, and *Leptocottus armatus* (3019)

Brachyphallus crenatus (Rudolphi, 1802) Odhner, 1905 - (3019,p30)
Coll: B. C.; Washington; Oregon (3019,p30)
Hab: Parasite of *Salvelinus malma* and *Oncorhynchus tshawytscha* (3019)

Derogenes crassus Manter, 1934 - (3019,p31)
Coll: Oregon (3019,p31)
Hab: Parasite of *Ophiodon elongatus* and *Sebastodes paucispinus* (3027)

PLATYHELMINTHES - TREMATODA - Digenea

Derogenes varicus (Mueller, 1784) Looss, 1901 - (3019,p31)
Coll: Washington; Oregon (3019,p31)
Hab: Parasite of many species of fish (3019)

Genolinea laticauda Manter, 1925 - (3019,p32)
Coll: B. C.; Washington; Oregon (3019,p32) (3027)
Hab: Parasite of *Scorpaenichthys mormoratus*, *Ophiodon elongatus*, *Leptocottus armatus*, *Enophrys bison*, and *Blepsias cirrhosis* (3027), *Clinocottus globiceps* and *Olizocottus maculosus* (3403)

Genolinea manteri Lloyd, 1938 - (3019,p32)
Coll: Washington; Oregon (3019,p32)
Hab: Parasite of *Leptocottus armatus*, *Lumpenus sagitta*, *Enophrys bison*, and *Dasycottus setiger* (3019,3027)

Genolinea montereyensis Annereaux, 1947 - (3019,p32)
Coll: Oregon (3019,p32) (3027)
Hab: Parasite of *Leptocottus armatus* (3027)

Hemiurus levinseni Odhner, 1905 - (3019,p33)
Coll: B. C.: Washington; Oregon (3019,p33)
Hab: Parasite of *Oncorhyncus tshawytscha*, *O. gorbuscha*, *Sebastodes ruberrimus*, *S. caurinus*, *Ophiodon elongatus*, *Microgadus proximus*, and *Theragra chalcogramma* (3019)

Lecithaster salmonis Yamaguti, 1934 - (3019,p33)
Coll: B. C.: Washington (3019,p33)
Hab: Parasite of *Clinocottus acuticeps*, *C. embryum*, *C. globicens*, and *Olizocottus snyderi* (3403)

Lecithochirium exodicum McFarlane, 1936 - (3019,p34)
Coll: B. C.: Washington; Oregon: Cape Arago (3019,p34) (3025)
Hab: Parasite of *Eopsetta jordani* (3025)

Neopodocotyloides pedunculata (Park, 1937) - (3137)
Coll: Oregon tidepools (3403)
Hab: Parasite of *Olizocottus maculosus* (3403)

Otodistomum veliporum (Creplin, 1837) Stafford, 1904 - (3019,p17)
Coll: Washington; Ore: Lincoln Co. (3019,p17)
Hab: Parasite of *Raja binoculata* and *Hexanthus griseus* (3019)

PLATYHELMINTHES - TREMATODA - Digenea

Podocotyle atomon (Rudolphi, 1802) Odhner, 1905 - (3019,p45)
Coll: B. C. (3019,p45); Oregon (3403)
Hab: Parasite of *Clinocottus globiceps* (3403)

Podocotyle blennicottusi Park, 1937 - (3137)
Coll: Oregon tidepools (3403)
Hab: Parasite of *Clinocottus globiceps* (3403)

Podocotyle californica Park, 1937 - (3137)
Coll: Oregon tidepools (3403)
Hab: Parasite of *Clinocottus globiceps* and *Olizocottus maculosus* (3403)

Podocotyle olssoni Odhner, 1905 - (3019,p45)
Coll: Ore: Coos Co. (3019,p45)
Hab: Parasite of *Leptocottus armatus* (3019)

Podocotyle reflexa (Creplin 1825) Odhner 1905 - (3019,p46)
Coll: B. C.; Oregon (3019,p46)
Hab: Parasite of *Signathus griseo-lineatus*, *Leptocottus armatus*, and *Clinocottus globiceps* (3019) (3403)

Prosorhynchus squamatus Odhner, 1905 - (3019,p19)
Coll: Ore: Lincoln Co. (3019,p19)
Hab: Parasite of *Enophrys bison* (3019)

Syncoelium katuwo Yamaguti, 1938 - (3019,p55)
S. filiferum (Sars) - (3019)
Coll: Washington (3019,p55)
Hab: Parasite of *Oncorhyncus nerka* and *O. gorbuscha* (3019)

Telolecithus pugetensis Lloyd and Guberlet, 1932 - (3019,p40)
Coll: B. C.; Washington; Oregon (3019,p40)
Hab: Parasite of *Cymatogaster aggregatus* (3019)
Remarks: Life history (3232)

Tubulovesicula lindbergi (Layman, 1930) Yamaguti 1939 - (3019,p35)
Coll: B. C.; Washington; Oregon; California
Hab: Parasite of numerous fish species (3019,p35)
Remarks: Synonyms and hosts (3019,p35)

PLATYHELMINTHES - CESTODA

Zoogonoides viviparus (Olsson, 1868) Odhner, 1902 - (3019,p56)
Coll: Washington (3019,p56); Oregon (3403)
Hab: Parasite of Microstomus pacificus, Clinocottus globiceps, and Olizocottus snyderi (3019) (3403)

Class: CESTODA

Although several species of tapeworm are known to occur in coastal hosts of the Pacific Northwest, none was found to be reported in the literature.

PHYLUM NEMERTEA

Amphiporus angulatus (Fabr.) Verrill - (2091,pl22)
Dist: Bering Strait to Puget Sound; New England to Greenland (2091,pl22)

Amphiporus bimaculatus Coe, 1901 - (2033,p59)
Dist: Southern Alaska; Puget Sound to Monterey Bay, Calif. (2091,pl22)
Coll: Intertidal on central Calif. coast (2033,p59)

Amphiporus brunneus Griffin - (2091,pl22)
Coll: Puget Sound (2091,pl22)

Amphiporus drepanophoroides Griffin - (2091,pl22)
Coll: Puget Sound (2091,pl22)

Amphiporus formidabilis Griffin - (2091,pl22)
Dist: Aleutian Island, Alaska to Monterey Bay, Calif. (2091,pl22)

Amphiporus imparispinosus Griffin, 1898 - (2033,p59)
Dist: Pacific coast of Alaska to southern coast of Calif. (2091,pl22)
Hab: Among coralline algae on exposed rocks (2033,p59)

Amphiporus nebulosus Coe - (2091,pl22)
Dist: Pacific coast of Alaska Peninsula (2091,pl22)

NEMERTEA

Amphiporus tigrinus Coe - (2091,pl22)
Coll: British Columbia (2091,pl22)

Baseodiscus punnetti (Coe, 1904) - (2033,p59)
Coll: Intertidal on central Calif. coast (2033,p59)

Carinella albocincta Coe - (2091,pl21)
Coll: Off San Pedro, Calif. (2091,pl21)

Carinella capistrata Coe - (2091,pl21)
Dist: Prince William Sound, Alaska to Monterey Bay, Calif. (2091,pl21)

Carinella cingulata Coe - (2091,pl21)
Coll: Monterey Bay, Calif. (2091,pl21)

Carinella frenata Coe - (2091,pl21)
Coll: San Pedro, Calif. (2091,pl21)

Carinella rubra Griffin - (2091,pl21)
Dist: Whole Pacific coast of Alaska to Vancouver Island, B. C. (2091,pl21)
Hab: Lies under stones or crawls on sand (2031,p73)

Carinella sexlineata Griffin - (2091,pl21)
Dist: Sitka, Alaska to San Pedro, Calif. (2091,pl21)

Carinoma mutabilis Griffin, 1898 - (2033,p59)
Dist: Vancouver Island, B. C. to San Pedro and San Diego, Calif. (2091,pl21)
Hab: In mud flats (2033,p59)

Carcinonemertes epialti Coe, 1902 - (2033,p59)
Coll: Central Calif. coast (2033)
Hab: In egg masses of *Pugettia* and other crabs (2033,p59)

Cephalothrix linearis (Rathke) Oersted - (2091,pl21)
Dist: Whole Pacific coast of Alaska to southern coast of Calif.; New England; northern coasts of Europe; Mediterranean Sea (2091,pl21)

NEMERTEA

Cerebratulus albifrons Coe - (2091,pl23)
Dist: Southeastern coast of Alaska to southern coast of Calif. (2091,pl23)

Cerebratulus californiensis Coe, 1905 - (2033,p59)
Coll: Central Calif. coast (2033)
Hab: In sand and mud flats (2033,p59)

Cerebratulus herculeus Coe - (2091,pl23)
Dist: Southeast coast of Alaska; Puget Sound (2091,pl23)

Cerebratulus marginatus Renier - (2091,pl23)
Dist: Southeastern coast of Alaska to southern coast of Calif.; New England to Greenland; northern coasts of Europe; Mediterranean Sea (2091,pl23)

Cerebratulus montgomeryi Coe - (2091,pl23)
Dist: Aleutian Island, Alaska to Puget Sound (2091,pl23)

Cerebratulus occidentalis Coe - (2091,pl23)
Dist: Pacific coast of Alaska to British Columbia (2091,pl23)

Emplectonema bürgeri Coe - (2091,pl21)
Dist: Southern coast of Alaska to Puget Sound (2091,pl21)
Hab: Under stones on sandy beaches (2031,p71)

Emplectonema gracile (Johnston, 1837) - (2033,p59)
Emplectonema gracile(Johnston, 1837) Verrill - (2091,pl21)
Dist: Whole Pacific coast of Alaska to Monterey Bay, Calif.; northern coasts of Europe; Mediterranean Sea; Madeira (2091,pl21)
Hab: Occurs in masses among mussels and barnacles on pilings (2033,p59)

Lineus vegetus Coe, 1931 - (2033,p59)
Coll: Intertidal on central Calif. coast (2033,p59)

Malacobdella grossa (O. F. Müller, 1776) - (2033,p59)
Coll: Intertidal on central Calif. coast (2033,p59)

Micrura alaskensis Coe, 1901 - (2033,p59)
Coll: Central Calif. coast (2033)
Hab: In mud flats (2033,p59)

NEMERTEA

Micrura impressa (Stimpson) Coe - (2091,pl 23)
Dist: Bering Strait to Puget Sound (2091,pl 23)

Micrura pardalis Coe, 1905 - (2033,p59)
Coll: Intertidal on central Calif. coast (2033,p59)

Micrura verrilli Coe, 1901 - (2033,p59)
Dist: Pacific coast of Alaska to Monterey Bay, Calif. (2091,pl 23)
Hab: Intertidal (2033,p59)

Nemertopsis gracilis Coe, 1904 - (2033,p59)
Coll: Central Calif. coast (2033,p59)
Hab: Under large boulders embedded in coarse sand (2033,p59)

Paranemertes carnea Coe - (2091,pl 22)
Dist: Pacific coast of Alaska and British Columbia (2091,pl 22)

Paranemertes peregrina Coe - (2091,pl 21)
Dist: Whole Pacific coast of Alaska to southern coast of Calif. (2091,pl 21)
Coll: Wash: Puget Sound (2031,p75); Calif: central (2033,p59)
Hab: Crawls on sand or stones (2031,p75); among mussels and corallines on exposed rocks, often out in open (2033,p59)

Tetrastemma nigrifrons Coe, 1904 - (2033,p59)
Coll: Intertidal on central Calif. coast (2033,p59)

Tubulanus pellucidus (Coe, 1895) - (2033,p59) (2686)
Coll: Clam Beach, Mad River, Calif. (2686,p32)
Hab: In mud, sands, gravel, and under stones (2033,p59) intertidal (2686,p32); in delicate tubes under stones, among algae, or in sand (2033,p57)

Tubulanus polymorphus Renier, 1804 - (2033,p59)
Coll: Central Calif. coast (2033,p59)
Hab: Under heavy boulders bedded in gravel (2033,p59)

Tubulanus sexlineatus (Griffin, 1898) - (2033,p59)
Coll: Intertidal on central Calif. coast (2033,p59)

PHYLUM ACANTHOCEPHALA

Illiosentis centratus Van Cleave 1945
  Coll: California
  Hab: Parasite of *Menticirrhus undulatus*, *Roncador stearnsi*, and *Umbrina roncador* (3132)

Polymorphus altmani (Perry, 1942) Van Cleave, 1947
  Coll: California
  Hab: Parasite of *Melanitta perspicillata* and *Melanitta deglandi* (3182)

Rhadinorhynchus coloabis Laurs and McCauley - (3404)
  Coll: Oregon, 42°00'N and 126°00'W (3404)
  Hab: Parasite of *Cololabis saira* (Brevoort. 1850) (3404)

PHYLUM PRIAPULIDA

Priapulus caudatus Lamarck, 1816
  Dist: Puget Sound to Tomales Bay (2033,pl11); northern Japan, North Atlantic (2033,pl11)
  Hab: Sticky mud bottom, moves about the substrate (2033,pl11)
  Ecology: (2102)
  Description of Larva: (2034)
  Morphology of Larva: (2103)

PHYLUM NEMATODA

Dagda phenneyi Murphy 1964
  Coll: Ore: Umpqua Light House State Park, Sandy Beach, intertidal (3394)

Desmodora papillastoma Murphy, 1962
  Coll: Ore: 2 mi. offshore from Newport; from a sandy substrate (dredge) (2704)

NEMATODA

Lauratonema obtusicaudatum Murphy and Jensen 1961
Coll: Ore: South Slough, Charleston (3015)
Hab: Subtidal (3015)

Mononchus truncatus Bastian, 1865
Coll: Ore: Gold Beach, Pacific City, Tillamook, Yaquina Head (2019)
Hab: Intertidal (ocean shores) (2019)

Notochaetosoma costeriata Murphy, 1963
Coll: Ore: Marine Gardens, north of Devils Punch Bowl; associated with hold-fast of *Costeria costata* (3396)

Oncholaimus dujardinioides Chitwood, 1960
Coll: Calif: Dillon Beach (3391)
Hab: Algae behind rocks, between tide levels (3391)

Oncholaimus skawensis H. Ditlevsen, 1921
Coll: Calif: Dillon Beach (3391)
Hab: Holdfasts of *Egregia laevigata* Setchell (3391)

Phanoderma segments Murphy, 1963
Coll: Ore: Devils Punch Bowl (3396)
Hab: Intertidal, rock scrapings (3396)

Phyllolaimus tridentatus Murphy 1963
Coll: Ore: Newport from intertidal beach sand exposed to moderate wave action (3395)

Pomponema polydonta Murphy 1963
Coll: Ore: Newport from intertidal beach sand exposed to moderate wave action (3395)

Pontharpinia obtusidens Alderman
Dist: Oregon to California
Coll: Ore: Sunset Bay (2008, p4)
Hab: Subtidal (Alan Hancock Foundation Stn. 1464-42) (2008, p4)

Porracaeuum decipiens
Larvae in Pacific rockfish *Sebastodes alutus* (erroneously referred to as trematode) (3233) (3409)

NEMATODA

Prochromadora trisupplementa Murphy, 1963
Coll: Ore: Yaquina Head, Newport, from epiphytic filamentous algae encompassing the stipe of Egregia menziessii (Turner, 1800) Areachoug, 1876 (3395)

Rhabdodemania minor (Southern 1914)
subsp. oregonensis Murphy
Dist: 2 miles offshore near Newport, Oregon (44°53.3'N, 124°07.5'E) from a sandy substrate at a depth of 55m (dredgings) (2704)

Rhynconema subsetosa Murphy, 1964
Coll: Ore: Governor Patterson Memorial State Park, near Waldport (3393)
Hab: In sand washings from open beaches and in mid-tide zone (3393)

Spilosphorella furecata Murphy, 1963
Coll: Ore: Devils Punch Bowl (3396)
Hab: Intertidal rock scrapings (3396)

Synonchiella spiculora Murphy, 1962
Coll: Ore: 2 mi. offshore near Newport from sandy substrate at 55m (dredgings) (2704)

Thoracostoma pacifica Murphy, 1965
Coll: Ore: Haystack Rock, from sediments under mussel beds located in high-tide zone (3399)

PHYLUM ENTOPROCTA

Barentsia gracilis (M. Sars), 1835 - (2283, p765)
Dist: Cosmopolitan; number of localities in B. C.; southern Calif. (2283, p765)
Coll: Calif: Abundant in San Francisco Bay, imbedded in thick mats largely of detritus and mucous secretion of animals
Temp: 16°C upper limit of material kept in finger bowl (3658)
20°C causes high coloney disintegration (3658)
27°C Entoprocts were collected without stalks or calyces (3658)

ENTOPROCTA

Barentsia gracilis var. nodosa (Lomax, 1886) - (2033, p281)(2280, p92)
Coll: Wash: Griffin Bay, 15-23m (2280, p92); central Calif. coast (2033, p281)
Hab: Under water in tide pools, on bases of corallines and other algae (2033, p281)

Barentsia parva (O'Donoghue and O'Donoghue) - (2280, p92)
Coll: Wash: Friday Harbor and Griffin Bay, 15-23m (2280, p92)

Barentsia ramosa (Robertson, 1900) - (2280, p92) (2033, p281)
Coll: Several localities in B. C. (2283, p767); Channel Rocks, Puget Sound (2280, p92); Calif: central coast in tidepools on bases of corallines and other algae (2033, p281)

Myosoma spinosa Robertson, 1900 - (2033, p281)
Coll: Central Calif. coast (2033, p281)
Hab: Intertidal (2033, p281)

Pedicellina cernua (Pallas), 1771 - (2283, p763) (2033, p281)
Dist: Cosmopolitan (2283, p763)
Coll: Several localities in B. C., Five Fingers, B. C.; Calif: Tomales Bay and Lime Point and southern Calif. (2283, p763)
Hab: Littoral species, usually found on piles of docks or at low tide (2283, p763)

Pedicellina nutans (?) Ballyell - (2635, p240)
Dist: Yakutat, Alaska to Tomales Bay, Calif. (2635, p240)

PHYLUM ECTOPROCTA

Class: CTENOSTOMATA

Alcyonidium gelatinosum (Linnaeus) - (2280, p93)
Coll: Washington (2280)

Alcyonidium mammillatum Alder, 1857 - (2283, p729)
Coll: Vicinity of Vancouver Island; Friday Harbor, Puget Sound; depth range 15-70 fms (2283, p730)

ECTOPROCTA - CTENOSTOMATA

Alcyonidium mytili Dalyell, 1847 - (2033, p281)
Coll: Central Calif. coast (2033, p281)
Hab: Intertidal (2033, p281)

Alcyonidium parasiticum (Fleming), 1828 - (2283, p729)
Dist: From Pacific Northwest to Tomales Bay, Calif., at 5 fms (2283, p729)

Alcyonidium polyoum (Hassall, 1841) - (2033, p281)
Dist: Alaska (2283, p729) to central Calif. coast (2033, p281)
Coll: B.C. (2283, p729); Puget Sound (2283, p729)
Hab: Legs of old, heavily encrusted kelp crabs (2033, p281)

Bowerbankia gracilis var. *aggregata* O'Donoghue, 1926 - (2033, p281)
Dist: Puget Sound, Wash. (intertidal to 9 fms) (2283, p744) to central Calif. coast (2033, p281)
Hab: Extremely abundant on pilings (2033, p281)

Clavopora occidentalis (Fewkes), 1889 - (2283, p735)
Dist: Vancouver Island, B.C. to Calif. (2283, p736)

Farrella elongata (P. J. van Beneden), 1845 - (2283, p750)
Coll: Ore: Coos County, intertidal (2283, p751)
Hab: Epizoic on chiton *Ischnochiton mertensii*; ventral surface of chiton's girdle; dense mat-like network of colonies on substrate (3799, p290)

Flustrella corniculata (Smitt, 1871) - (2283, p732) (2033, p281)
Dist: Vancouver Island region and Puget Sound, B.C. to Calif. (2283, p733)
Hab: Depth range from intertidal to 36 fms (2283, p733); on coralline algae (2033, p281)

Nolella stipata Gosse, 1855 - (2283, p737)
Dist: Queen Charlotte Islands, B.C. to Puget Sound, Wash. (2283, p738)
Coll: B.C.: vicinity of Vancouver Island (2283, p738)
Hab: Depth range from 17-47 fms (2283, p738)

ECTOPROCTA - CTENOSTOMATA

Triticella elongata (Osburn, 1912) - (2033, p281)
Coll: Central Calif. coast (2033, p281)
Hab: On legs of various crabs; because of transparency and insensitivity to handling, this is superb class material (2033, p281)

Class: CYCLOSTOMATA

Bicrisia edwardsiana (d'Orbigny), 1839 - (2283, p676)
Dist: Alaska to San Diego, Calif., possibly extends along whole Pacific coast (2283, p676)

Buskia nitens Alder, 1857 - (2283, p747)
Dist: B.C. to Coos County, Oregon, intertidal to 25 fms (2283, p747)

Crisia edwardsiana (d'Orbigny) Busk - (2287, p237)
Dist: Alaska to southern Calif. (2287, p239)
Coll: Alaska: between tide marks at Sitka, Juneau, Yakutat, and Orca (2287, p239); Puget Sound: low tide on Channel Rocks (2287, p239); Calif: between tide marks in company with other species of Crisia at Fort Point and Lands End, San Francisco; at Deadman's Island, San Pedro and at La Jolla; dredged off San Diego in depths ranging from 16-30 fms (2287, p239)

Crisia franciscana (Robertson, 1910) - (2287, p233)
Dist: Alaska to southern Calif. (2287, p235)
Coll: Alaska: Orca, growing on worm tubes; Puget Sound: low tide (2287, p235); Calif: abundant between tide marks at Fort Point and Land's End, San Francisco; also at Dillon Beach, Navarro, and Pacific Grove; shore rocks at Ballast Point, Coronado, and dredged at numerous stations on coast of southern California in depths ranging from 2-19 fms (2287, p235)

Crisia maxima Robertson, 1910 - (2283, p682)
Dist: B.C. to southern Calif. (2283, p682)
Coll: B.C.: localities down to 25 fms (2283, p682); Calif: between tide marks and dredged from San Pedro to Coronado Island down to 40 fms (2283, p682)

ECTOPROCTA - CYCLOSTOMATA

Crisia occidentalis Trask, 1857 - (2033, p281)
Dist: Washington (2280, p94) to central Calif. (2033, p281)
Coll: Wash: Copalis Rocks (2280, p94); Calif: between tide marks at Land's End and Fort Point, San Francisco; in smaller quantity at low tide on Deadman's Island, San Pedro; between tide marks at Mendocino City and at Navarro; dredged in 10 fms off Santa Cruz lighthouse; dredged off San Pedro in 2-6 fms (2287, p240)

Crisia serrata (Gabb and Horn, 1862) - (2033, p281)
Coll: Central Calif. coast (2033, p281)
Hab: Low intertidal among sponges and hydroids (2033, p281)

Crisia serrulata, Osburn, 1953 - (2283, p679)
Dist: A common species all along coast from B. C. southward to 28°N (2283, p680)

Diaperoecia californica (d'Orbigny), 1852 - (2283, p642)
Dist: Northern limit of range is B. C., most southern record is Costa Rica (2283, p644)
Hab: Bathymetric range is low tide to about 100 fms (2283, p644)

Disporella fimbriata (Busk), 1875 - (2283, p709)
Dist: B. C. to southern Calif. (2283, p709)
Coll: B. C.: Round Island (2283, p709)

Filicrisia franciscana (Robertson), 1910 - (2283, p677) (2033, p281)
Dist: Orca, Alaska to southern Calif. (2283, p678)
Coll: Puget Sound: San Juan Islands (2283, p678); No.Calif: Mussel Point (2283, p678)
Hab: Often occurring in considerable masses on piles and floats; low tide to 50 fms (2283, p678) (2033, p281)

Filicrisia geniculata (Milne-Edwards), 1838 - (2283, p677)
Dist: B. C. to Calif. (2283, p677)
Coll: Calif: Dillon Beach, north of San Francisco; San Pedro (2283, p677)

Heteropora alaskensis (Borg), 1933 - (2283, p695)
Dist: B. C.: Bentinck Islands, Clayoquot Wharf (2283, p696)
Ore: off Cape Arago lighthouse, 43° 20'26"N, 124°22'24"W, at very low tide, 5 fragments (2283, p696)

ECTOPROCTA - CYCLOSTOMATA

Heteropora pacifica Borg, 1933 - (2283, p694)
Dist: Considerable range along Pacific coast from Alaska to Calif. (2283, p695)

Heteropora pelliculata Waters - (2287, p258)
Dist: Puget Sound to northern Calif. (2287, p260)
Coll: Puget Sound: Channel Rocks, dredged at San Juan County from unknown depth (2287, p260)

Idmonea californica d'Orbigny, 1852 - (2033, p281)
Coll: Central Calif. coast (2033, p281)
Hab: On holdfasts, low intertidal or subtidal (2033, p281)

Lichenopora novae-zelandiae (Busk), 1875 - (2283, p705)
L. radiata, Robertson - southern Calif. (2283, p706)
Dist: B.C. to Calif. (2283, p706-707)

Proboscina major (Johnston), 1847 - (2283, p621)
Dist: B.C. to Galapagos Islands (2283, p622)
Coll: Puget Sound: San Juan Islands (2283, p622)

Stomatopora granulata (Milne-Edwards) - (2280, p93) (2283, p620)
Dist: B.C. to San Pedro, Calif. (2283, p620)
Coll: Puget Sound: San Juan Channel off Point Caution, 40-45m (2280, p93)
Hab: On shells (2283, p620)

Tubulipora fasciculifera Hincks - (2280, p95)
Tubulipora tuba var. fasciculifera Hincks 1884 - (2283, p651)
Dist: B.C. to southern Calif. (2283, p652)
Coll: Wash: Friday Harbor (2280, p95)

Tubulipora flabellaris (Fabricius) - (2280, p95) (2283, p657)
Dist: B.C. to southern Calif. (2283, p658)
Coll: Puget Sound: Channel Rocks (2280, p95); Calif: San Pedro (2287, p248)
Hab: On kelp (2287, p248)

Tubulipora occidentalis Robertson, 1910 - (2287, p249)
Dist: Channel Rocks, Puget Sound, Wash. to southern Calif. (2287, p249)

Tubulipora occidentalis Robertson, 1910 - continued

Coll: Calif: Whites Point, near San Pedro; Monterey Bay (2287, p249)

Hab: Intertidal; infesting stems of coralline; dredged at several stations off coast of southern Calif. in depths ranging from 4-32 fms (2287, p249)

Tubulipora pacifica Robertson, 1910 - (2033, p281)

Dist: B.C. (2283, p652) to central Calif. (2033, p281)

Hab: Found on Mytilus shell fragments in lower intertidal (2033, p281); apparently a shallow-water species, but dredged down to 47 fms (2283, p652)

Tubulipora pulchra MacGillivray - (2280, p95) (2283, p653)

Dist: B.C. to southern Calif. coast (2283, p653)

Tubulipora tuba (Gabb and Horn, 1862) - (2033, p281)

Dist: B.C. to southern Calif. (2283, p650)

Coll: Puget Sound: San Juan Channel off Point Caution, 40-45m (2280, p95); Calif: central coast (2033, p281)

Hab: Found on Mytilus shell fragments in lower intertidal (2033, p281)

Class: CHEILOSTOMATA

Aetea anguina (Linnaeus, 1758) - (2281, p11)

Dist: Gabriola Pass, B.C. to San Diego, Calif., Peru, the Galapagos Islands. Maine to Brazil on east coast, shore line to 30 fms (2281, p11-12)

Coll: Wash: Puget Sound (2281, p11-12); Ore: (2281, p11-12); Calif: San Pedro (2281, p11-12)

Aetea recta Hincks- (2281, p12)

Dist: San Juan Islands to islands off southern Calif., Gulf of Calif., shore to 80 fms (2281, p12)

Aetea truncata (Landsborough) - (2280, p98) (2281, p12)

Coll: Wash: Friday Harbor, San Juan Channel off Point Caution, 40-45m (2280, p98); So. Calif: Anacapa Island, 10-36 fms; common along shore (2281, p13)

ECTOPROCTA - CHEILOSTOMATA

Arthropoma cecili (Audouin), 1826 - (2282, p333)
Dist: B.C. to San Pedro, Calif. (2282, p334)

Beania mirabilis Johnston, 1840 - (2281, p170)
Dist: B.C. to Columbia (2281, p170)

Bugula californica Robertson, 1905 - (2033, p281)
Dist: B.C. to Galapagos Island (2281, p157)
Coll: Calif: central (2033, p281)
Hab: Characteristic of low intertidal, beneath ledges; best demonstration of avicularia (2033, p281)

Bugula flabellata (J. V. Thompson, 1847) - (3003, p16)
Dist: Oregon, 92-128m (3003, p16) to San Diego Bay, Calif., growing on piles (2281, p157)

Bugula laxa Robertson - (2280, p99)
Dist: Puget Sound (Channel Rocks) (2280, p99) to Pacific Grove, Calif. (2285, p276)

Bugula longirostrata Robertson, 1905 - (2281, p156)
Dist: B.C. to Galapagos Island, from shore to 125 fms (2281, p156)

Bugula neritina (Linnaeus, 1758) - (2033, p281) (2281, p155)
Coll: Central Calif. coast (2033, p281)
Hab: Characteristic of harbors and pilings (2033, p281)

Bugula pacifica Robertson - (2031, p113) (2281, p155)
Dist: Pribilof Island, Bering Sea, to San Francisco Bay (2285, p270)
Coll: Puget Sound: Roche Harbor, Sidney, Channel Rocks (2280, p100)
Hab: Attached to rocks (2031, p113)

Bugula pugeti Robertson 1905 - (2280, p100) (2281, p158)
Dist: Sitka, Alaska to San Francisco Bay, Calif. (2285, p272) (2281, p158)
Coll: Wash: San Juan Island, Puget Sound (2280, p100); Calif: Tomales Bay (2281, p158)
Hab: Dredged from 10 fms (2285, p272)

ECTOPROCTA - CHEILOSTOMATA

Bugula purpurotincta Norman - (2635, p228)
Dist: Bering Sea (Pribilof Islands) to Tomales Bay, Calif. (2635, p228)
Coll: Wash: Puget Sound (2635, p228)
Hab: Very abundant upon *Styela* and upon rocks (2635, p228)

Cabera ellisi (Fleming 1828) - (3003, p16) (2635, p227) (2280, p98)
Dist: Juneau, Alaska to Lower Calif. (2281, p130)
Coll: Alaska: (2635, p227); B.C.: (2635, p227); Wash: Puget Sound, Deer Harbor and San Juan Channel off Point Caution, 40-45m (2280, p98); Ore: 55-106m (3003, p16)
Hab: Found growing on a shell dredged at 20 fms; obtained also on rocks at low tide (2635, p227)

Callopora circumclathrata (Hincks) 1881 - (2280, p97) (2281, p65)
Dist: B.C. to southern Calif. (2281, p66)
Coll: Wash: Puget Sound: Griffin Bay and San Juan Channel off Point Caution, 15-45m (2280, p97); Calif: Santa Cruz; various localities near coast of southern Calif.; Santa Barbara Island, 20 fms; Del Monte, 25 feet; in shallow water at Palos Verdes, Redondo Beach and Santa Monica; Pleistocene of Santa Monica Canyon (2281, p66)

Callopora corniculifera (Hincks, 1884) - (3003, p16)
Dist: Cumshewa, B.C. to Calif. (2281, p67)
Coll: Ore: 55m (3003, p16); Calif: Catalina Island, 38 fms on brachiopod shells; Tomales Bay, 6 fms on clam shells (2281, p67)

Callopora horrida (Hincks, 1880) - (2033, p281)
Dist: B.C. to Pacific Grove, Calif. (2281, p69)
Coll: Puget Sound: Friday Harbor; Griffin Bay and San Juan Channel off Point Caution; low tide to 45m (2280, p97) Calif: central, intertidal (2033, p281)

Callopora lineata (Linneaus), 1758 - (2281, p68)
Dist: Nunivak Island, Alaska to Dillon Beach, Calif. It does not appear to be a common species on Pacific coast (2281, p68)

Caulibugula californica (Robertson), 1905 - (2281, p162)
Coll: B.C.: 8-40 fms; Ore: Depoe Bay, intertidal; Calif: La Jolla, 125 fms (2281, p162)

ECTOPROCTA - CHEILOSTOMATA

Caulibugula ciliata (Robertson, 1905) - (2033, p281) (2281, p161)
Dist: B.C. (2281, p161) to central Calif. coast (2033, p281)
Hab: Underwater in lower mid-tidal, often on sponges (2033, p281)

Caulibugula occidentalis (Robertson), 1905 - (2281, p161)
Dist: B.C. to southern Calif. (2281, p162)
Coll: Ore: Yaquina Bay (2281, p162); Calif: San Luis Obispo Bay, low tide to 14 fms; Santa Rosa Island, 16 fms (2281, p162)

Cauloramphus echinus (Hincks), 1882 - (2281, p56)
Dist: Queen Charlotte Island to Calif. (2281, p56)
Coll: B.C.: Vancouver Island region, low tide to 30 fms (2281, p56); Calif: east of Santa Rosa Island, 23 fms; Tomales Bay (2281, p56)

Cauloramphus spiniferum (Johnston, 1832) - (2033, p281)
Cauloramphus spinifer (Johnston, 1832) - (2280, p98)
Dist: Alaska to southern Calif. (2281, p55)
Coll: Wash: Puget Sound, San Juan Channel off Point Caution, 40-45m (2280, p98); Calif: central, intertidal (2033, p281)

Cellaria diffusa Robertson, 1905 - (3003, p16)
Dist: B.C. to San Diego, Calif. (2281, p117) (2285, p290)
Coll: Puget Sound: San Juan Island and Port Orchard channel (2280, p100); Ore: 55-146m (3003, p16)

Cellaria mandibulata Hincks, 1882 - (2281, p116)
Dist: Virago Sound, B.C. to southern Calif. (2281, p116)

Cellepora incrassata Lamark - (2286, p312)
Dist: Alaska to Santa Cruz, Calif. (2286, p313)
Coll: Queen Charlotte Island (2286, p313)

Chapperia patula (Hincks, 1881) - (2281, p89)
Dist: Queen Charlotte Island to Calif. (2281, p90)
Hab: From shallow water to 47 fms (2281, p90)

Cheilopora praelonga (Hincks) 1883 - (2282, p464)
Dist: B.C. to Washington (2282, p464)
Coll: B.C.: Masste Inlet (2282, p464); Wash: Friday Harbor, Puget Sound, Seattle, Tacoma, and Indian Island (2282, p464)
Hab: Intertidal to 20 fms (2282, p464)

ECTOPROCTA - CHEILOSTOMATA

Colletosia radiata (Moll), 1803 - (2281, p187)
Dist: B.C. to Galapagos Island and coast of Peru (2281, p188)
Hab: Shallow water down to 136 fms (2281, p188)

Conopeum sp. - (2033, p282)
Dist: Central Calif. coast (2033, p282)
Hab: Common on breakwater of Berkeley Yacht Harbor (2033, p282)

Conopeum reticulum (Linnaeus, 1767) - (2033, p282)
Dist: Alaska to southern Calif. (2281, p32)
Coll: Calif: central, intertidal (2033, p282)

Copidozoum planum (Hincks), 1880 - (2281, p73)
Dist: Coast of Calif. (2281, p73)

Copidozoum protectum (Hincks), 1884 - (2281, p73)
Dist: B.C., Victoria, San Juan Island northward; along whole western coast of U.S. and south along peninsula of Lower Calif. and in Gulf of Calif. (2281, p74)

Copidozoum tenuirostre (Hincks), 1880 - (2281, p72)
Dist: B.C. to Peru, from low tide to 70 fms (2281, p72)

Costazzia costazzii (Savigny-Audouin) - (2280, p106)
Costazia costazi (Audouin), 1826 - (2282, p506)
Dist: B.C. to Calif. (2282, p506)
Coll: Puget Sound: Griffin Bay, and San Juan Channel off Point Caution, 40-45m (2280, p106)

Costazia robertsoniae Canu and Bassler, 1923 - (2282, p507)
Dist: B.C. to Mexican border (2282, p508)

Costazia surcularis (Packard), 1863 - (2282, p510)
Dist: Alaska to northern Calif. (2282, p511)

Costazia ventricosa (Lorenz), 1886 - (2282, p511)
Dist: Alaska to Calif. (2282, p512)
Coll: Wash: Friday Harbor, Puget Sound (2282, p512)

Cribrilina hippocrepis Hincks - (2286, p280)
Dist: Queen Charlotte Island and Yakutat, Alaska to San Pedro and Coronados Islands, Calif. (2286, p280)

ECTOPROCTA - CHEILOSTOMATA

Dakaria apertura Osburn, 1952 - (2282, p326)
Dist: Tomales Bay at Dillon Beach, Calif., about 38°15'N at 6 fms (2282, p326)

Dakaria pristina (Hincks), 1883 - (2282, p328)
Dist: Dolomite Narrows, Gabriola Pass and off Round Island, B.C.; Tomales Bay, Dillon Beach, Calif. (2282, p328)

Dendrobeania laxa (Robertson, 1900) - (2033, p282)
Dendrobeanis laxa (Robertson, 1905 - (2281, p167)
Dist: B.C., shore to 20 fms, to Monterey Bay, Calif (2281, p167)
Coll: Wash: Puget Sound (2281, p167); Ore: Cape Arago lighthouse, reef and bight, intertidal (2281, p167); Calif: central (2033, p282)
Hab: Intertidal (2033, p282)

Dendrobeania lichenoides (Robertson, 1900) - (2033, p282)
Dist: Alaska to San Francisco, Calif. (2281, p168)
Coll: Ore: Cape Arago lighthouse, reef and bight, intertidal (2281, p168); Calif: central (2033, p282)
Hab: Among Perophora in shaded places in low intertidal (2033, p282)

Electra crustulenta (Pallas), 1766 - (2281, p35)
Dist: Yaquina Bay, Oregon to Dillon Beach and Monterey Bay, Calif. (2281, p36)
Hab: On shells along shore (2281, p36)

Ellisina levata (Hincks), 1882 - (2281, p50)
Dist: B.C. to Santa Barbara Island, Calif., 27 fms (2281, p50)
Coll: Houston Stewart Channel, 15-20 fms (2281, p50); Cumshewa, B.C. (2281, p90)

Eurystomella bilabiata (Hincks, 1884) - (2033, p282)
Dist: B.C. to central Calif. (2282, p389) (2033, p282)
Coll: B.C.: Houston-Stewart Channel, Brotchie Ledge, Victoria, and Bentinck Is. (2282, p389); Puget Sound (2280, p104)
Hab: Intertidal (2033, p282); common at low tide on rocky shores from Calif. northward, not frequently dredged, but has been taken at 35 fms (2282, p389)

Fenestrulina malusi (Audouin), 1926 - (2282, p387)
Dist B.C. to Channel Island off southern Calif. (2282, p388)
Hab: Depth 3 to more than 100 fms (2282, p388)

ECTOPROCTA - CHEILOSTOMATA

Flustra lichenoides Robertson - (2031, p121)
Dist: Alaska coast south to San Francisco (2285, p292)
Coll: Alaska: Yakutat, Orca, Prince William Sound (2635, p230); Puget Sound: (2635, p230) Channel Rocks (2280, p100); Calif: Point Cavallo (2635, p230)
Hab: Covers rocks, shallow sea bottom (2031, p121); upon shells, worm tubes, ascidians, and upon rocks at low tide (2635, p230)

Hincksina alba (O'Donoghue), 1923 - (2281, p41)
Dist: Protection Gap and Schooner Bay, B.C. to Santa Catalina Island, southern Calif. (2281, p41)
Hab: Down to 30 fms; on a brachiopod shell (2281, p41)

Hincksina velata (Hincks), 1881 - (2281, p44)
Dist: B.C. to Columbia, down to 60 fms (2281, p45)

Hippaliosina inarmata Osburn, 1952 - (2282, p476)
Coll: Off Oregon coast, 43°59'N, 124°56'30"W, 50 fms (2282, p476)

Hippodiplosia insculpta (Hincks, 1882) - (2033, p282)
Dist: Five Fingers, B.C. to coast of Costa Rica (2282, p342)
Coll: Ore: (2282, p342); Calif: central coast (2033, p282)
Hab: Common on stipes of red algae and under rocks (2033, p282); most abundant in shallow water but dredged as far down as 128 fms (2282, p342)

Hippomonavella longirostrata (Hincks), 1883 - (2282, p365)
Dist: B.C. to about 28°N latitude and bathymetric range from shallow water to 100 fms
Coll: Numerous localities in Puget Sound and B.C. (2282, p366)

Holoporella brunnea (Hincks), 1884 - (2282, p496)
Dist: B.C.: Banks Island; Oregon south to Ecuador (2282, p497)

Hippothoa divaricata Lamouroux - (2280, p101) (2282, p278)
Dist: B.C. to Calif. coast (2282, p278)
Coll: Puget Sound: San Juan Channel off Point Caution, 40-45m (2280, p101)

ECTOPROCTA - CHEILOSTOMATA

Hippothoa hyalina (Linnaeus, 1758) - (2033, p282)
Dist: Alaska to Calif. (2280, p101)
Coll: Puget Sound: Friday Harbor; Griffin Bay and San Juan Channel off Point Caution, 15-45m (2280, p101); Calif: central coast (2033, p282)
Hab: Common on fronds of red algae (2033, p282)

Lacerna fistulata (O'Donoghue), 1923 - (2282, p362)
Coll: B.C.: Departure Bay, 15 fms; Calif: Cortez Bank 32° 25'50"N, 119°07'30"W at 32 fms (2282, p362)

Lagenipora erecta O'Donoghue and O'Donoghue - (2280, p106)
Dist: Puget Sound (2280)

Lagenipora punctulata (Gabb and Horn, 1862) - (3003, p16)
Dist: B.C. to Monterey Bay, Calif. (2282, p486)
Coll: Oregon, 82-110m (3003, p16)

Lagenipora socialis Hincks, 1877 - (2282, p488)
Dist: B.C. to lower Calif. (2282, p488)

Lagenipora spinulosa Hincks - (2280, p106) (2282, p487)
Dist: Humpback Bay, Alaska to San Pedro, Calif. (2282, p488)
Coll: B.C.: Queen Charlotte Islands (2282, p488); Wash: Griffin Bay, 15-23m (2280, p106)

Lepralia bilabiata Hincks - (2286, p298)
Dist: Houston Channel, Queen Charlotte Island to Pacific Grove, Calif. (2286, p300)
Coll: Wash: Puget Sound (2286, p300); Calif: Mendocino City where it occurs between tide marks (2286, p300)

Lyrula hippocrepis (Hincks, 1882) - (2033, p282)
Dist: Yakutat to 26th N Parallel of latitude (2281, p184)
Coll: Puget Sound: Friday Harbor and San Juan Channel off Point Caution 40-45m (2280, p101); Calif: central coast (2033, p282)
Hab: Intertidal (2033, p282); bathymetric range, shallow water to 79 fms (2281, p185)

ECTOPROCTA - CHEILOSTOMATA

Membranipora fusca Osburn, 1950 - (2281,p25)
Dist: Calif. (2281,p25)
Coll: Mussel Point; Del Monte, intertidal to 6 fms; Tomales Bay, 5 fms (2281,p25)

Membranipora lacroixi (Audouin) Hincks - (2286,p261)
Dist: Alaska to Calif. (2286,p262)
Coll: Alaska: Kodiak, and Orca, Prince William Sound (2286,p262); Calif: San Pedro and San Diego (2286,p262)

Membranipora membranacea (Linnaeus, 1767) - (2033,p282)
Dist: Alaska to Calif. (2286,p268)
Coll: Washington (2031), Puget Sound: Cop[illegible]s Rocks (2280,p96); Calif: central coast (2[illegible],p282)
Hab: Characteristic of floating kelps, *Macrocystis* and *Nereocystis*, just offshore (2033,p282); encrusts on kelp, and fronds and rocks (2031,p117)

Membranipora patula Hincks - (2286,p263)
Dist: Queen Charlotte Island to Calif; varying from depths of 15-42 fms (2286,p263)

Membranipora serrilamella Osburn, 1950 - (2281,p22)
Dist: B. C. to southern Calif. (2281,p23)
Coll: B. C.: Virago Sound (2281,p23); Wash: Puget Sound (2281,p23)
Hab: Excessively abundant on floating fronds of kelp and dredged on a few occasions down to 10 fms (2281,p23)

Membranipora spinifera (Johnston) Alder - (2286,p265)
Dist: Orca, Prince William Sound, Alaska to Calif. (2286,p265)
Hab: Considerable abundance on rocks and seaweed (2286,p265)

Membranipora tuberculata (Bosc, 1802) - (2033,p282)
Dist: Calif. to Peru (2281,p24) (2033,p282)
Hab: Intertidal (2033,p282); dredged in shallow water, usually on algae (2281,p24)

ECTOPROCTA - CHEILOSTOMATA

Membranipora villosa Hincks 1880 - (2280, p97) (2281, p22)
Dist: Puget Sound, B.C. to San Diego, Calif.
Coll: Puget Sound: Friday Harbor, Griffin Bay and San Juan Channel off Point Caution (2280, p97)
Hab: Low tide to 45m (2280, p97); probably very abundant in belt of kelp some distance out from shore (2286, p271)

Menipea erecta Robertson - (2280, p98)
Dist: Kodiak and Sitka, Alaska to Wash. (2285, p257)
Coll: Wash: Puget Sound; Friday Harbor, Griffin Bay and San Juan Channel off Point Caution; 15-45m (2280, p98)

Menipea occidentalis Trask - (2280, p99)
Dist: Queen Charlotte Islands to San Diego (2280, p99)

Menipea pribilofi Robertson - (2280, p99)
Coll: Washington (2280)

Menipea ternata Ellis and Solander - (2635, p224)
Dist: Queen Charlotte Islands to Calif. (2635, p224) (2285, p252)
Coll: Wash: Puget Sound, Copalis, Channel Rocks, San Juan Island and Griffin Bay, 15-23m (2280, p99) (2635, p224); Calif: Dillon Beach, Lime Point, Mendocino, Land's End (2285, p252)

Micropora coriacea (Esper) - (2280, p100)
Dist: B.C. to Calif. (2281, p100)
Coll: Puget Sound: Griffin Bay, 15-23m (2280, p100); Calif: Santa Catalina Island, Channel Islands (2281, p105)

Microporella californica (Busk, 1856) - (2033, p282); (Hincks) - (2280, p103)
Dist: San Juan Channel off Point Caution, 40-45m (2280, p103) to Galapagos Islands (2282, p382)
Coll: Ore: (2282, p382); Calif: central coast (2033, p282)
Hab: Intertidal (2033, p282)

Microporella ciliata (Pallas, 1766) - (2033, p282)
Dist: B.C. to Galapagos Islands (2282, p377)
Coll: Puget Sound: San Juan Channel off Point Caution, 40-45m (2280, p103); Calif: central coast (2033, p282)
Hab: Intertidal (2033, p282) from near shore to depth of 90 fms (2282, p377)

ECTOPROCTA - CHEILOSTOMATA

Microporella ciliata stellata (2282, p378)
Dist: B.C. to So. Calif. (2282, p378)
Coll: Cal: Mussel Point, Dillon Beach, Monterey Bay (2282, p378)

Microporella ciliata var. umbonata Hincks - (2280, p103) (2282, p378)
Coll: B.C.: Dolomite Narrow (2282, p379); Puget Sound: Friday Harbor, Griffin Bay and San Juan Channel off Point Caution, 15-45m (2280, p103); Calif: San Pedro, Santa Cruz Island, Dillon Beach (2282, p379)

Microporella ciliata var. vibraculifera Hincks - (2280, p104) (2282, p379)
Dist: B.C. to about 28° N latitude
Coll: B.C.: Queen Charlotte Islands (2282, p379); Wash: Friday Harbor, Griffin Bay, and San Juan Channel off Point Caution, 40-45m (2280, p104); Middle Bank, Puget Sound; Calif: San Pedro, Santa Monica, Santa Barbara (2282, p379)

Microporella cribosa Osburn, 1952 - (2282, p380)
Dist: Occurring commonly along shore from Mussel Point, northern Calif. southward to San Diego Bay, Calif. (2282, p381)

Microporella malusi (Audouin) Hincks - (2286, p282)
Dist: Queen Charlotte Island, B.C. to La Jolla and Catalina Islands, Calif. (2286, p283)
Hab: Growing on roots of kelp and dredged between 20 and 30 fms (2286, p283)

Mucronella ventricosa (Hassall) - (2280, p105) (2282, p436)
Dist: B.C. to Oregon (2282, p437)
Coll: Wash: Puget Sound (2282, p437), San Juan Channel off Point Caution, 40-45m (2280, p105)

Myriozoum coarctatum (Sars, 1850) - (3003, p16)
Dist: Alaska (2282, p514) to Oregon, 46-200m (3003, p16)
Coll: Wash: Puget Sound at 152 fms (2282, p514)

Myriozoum tenue O'Donoghue, 1923 - (3003, p16)
Dist: B.C. to Oregon (2282, p515) (3003, p16)
Coll: B.C.: Departure Bay, Buccaneer Bay and Swiftsure Shoal, 15-25 fms (2282, p515); Ore: 92m (3003, p16)

ECTOPROCTA - CHEILOSTOMATA

Parasmittina collifera (Robertson, 1908) - (2033, p282)
Dist: B.C. to southern Calif., common also at shore stations (2282, p417)
Coll: Ore: (2282, p417); Calif: central coast (2033, p282)
Hab: Intertidal (2033, p282)

Parasmittina trispinosa (Johnston), 1838 - (2282, p412)
Dist: B.C. to Galapagos Island (2282, p414)
Coll: Ore: dredged and collected along shore (2282, p414)

Pedicellina cernua (Pallas), 1771 - (2283, p763)
Dist: B.C. to Calif. (2283, p763)
Coll: B.C.: Five Fingers (2283, p763); Calif: Tomales Bay and Lime Point (2283, p763)
Hab: Littoral species, usually found on piles of docks or at low tide; cosmopolitan (2283, p763)

Phidolopora pacifica (Robertson, 1908) - (2033, p282)
Dist: B.C. to southern Calif. (2282, p449)
Coll: Puget Sound: Griffin Bay, 15-45m (2280, p106); Ore: (2282, p449); Calif: central coast (2033, p282)
Hab: Sub-tidal, or in deep, sheltered pools (2033, p282); shallow water to more than 100 fms, frequently found washed up on shore (2282, p449)

Porella acutirostris Smitt, 1867 - (2282, p394)
Dist: From Point Barrow, Alaska to southern Calif. (2282, p395)
Coll: B.C.: Round Island and Northumberland Channel (2282, p395); Wash: Middle Bank, Puget Sound (2282, p395)

Porella concinna (Busk), 1854 - (2282, p396)
Dist: B.C. to San Pedro Calif. (2282, p397)
Coll: Puget Sound: San Juan Island (2282, p397)

Porella porifera (Hincks), 1884 - (2282, p395)
Dist: Queen Charlotte Island, B.C. to lower Calif. (2282, p396)

Puellina setosa (Waters), 1899 - (2281, p186)
Dist: B.C. to Oregon, 20-60 fms (2281, p186)
Coll: Wash: Friday Harbor, San Juan Island, Puget Sound (2281, p186)

ECTOPROCTA - CHEILOSTOMATA

Retepora pacifica Robertson - (2031, p119)
Dist: Puget Sound, Wash. to Calif. (2286, p311)
Hab: Attached to rocks or shells intertidal to subtidal (2031, p119); between tide marks and dredged from depths of 20-30 fms (2286, p311)

Rhamphostomella curvirostrata O'Donoghue, 1923 - (2282, p430)
Dist: B.C. to southern Calif. (2282, p430)
Coll: B.C.: Bull Passage, Northumberland Channel 15-25 fms (2282, p430); Puget Sound: San Juan Island, Friday Harbor (2282, p430)

Rynchozoon tumulosum (Hincks, 1882) - (2033, p282)
Dist: B.C. to southern Calif. (2282, p459)
Coll: B.C.: Cumshewa (2282, p459); Calif: San Diego and San Pedro (2282, p459), central coast (2033, p282)
Hab: Intertidal (2033, p282); shore to more than 100 fms (2282, p459)

Schizomavella auriculata (Hassall), 1842 - (2282, p331)
Dist: B.C. to 29°N latitude (2282, p331)

Schizomavella auriculata ochracea (Hincks), 1880 - (2282, p331)
Dist: B.C. to Oregon (2282, p332)
Coll: B.C.: Queen Charlotte Islands, Gabriola Pass, Houston Channel (2282, p332); Ore: Charleston (2282, p332)
Hab: Shore to 49 fms (2282, p332)

Schizoporella biaperta (Michelin) Hincks - (2286, p287)
Dist: Alaska to southern Calif. (2286, p288)
Coll: B.C.: Queen Charlotte Islands (2286, p288); Calif: Point Loma, San Diego (2286, p288)

Schizoporella cecili (Audouin) Hincks - (2286, p288)
Dist: B.C. to Calif.
Coll: Not found in great abundance. Single specimen from Queen Charlotte Islands; only a single small piece of a colony growing over sponge occurs in collection from San Pedro, Calif. (2286, p288)

Schizoporella cornuta (Gabb and Horn, 1862) - (2033, p282)
Dist: Alaska to Galapagos Islands and from near shore to a depth of over 100 fms (2282, p321)
Coll: Central Calif. (2033, p282)
Hab: Intertidal (2033, p282)

Schizoporella hyalina (Linnaeus) Hincks - (2286, p289)
Dist: Abundant from Yakutat, Alaska to San Diego, Calif. (2286, p290)
Coll: B.C.: Queen Charlotte Islands (2286, p290); Calif: (2286, p290)
Hab: Interdidal (2286, p290)

Schizoporella insculpta Hincks - (2635, p234)
Dist: Sitka, Alaska to Coronados Islands, Calif. (2286, p291)
Coll: B.C.: Virago Sound, Cumshewa Harbor, Queen Charlotte Islands, Vancouver Island (2635, p234); Wash: Alki Point, Puget Sound, San Juan Channel off Point Caution, 40-45m (2280, p102); Calif: Pacific Grove (2286, p291)
Hab: 10-45 fms (2635, p234) (2280, p102) (2286, p291)

Schizoporella linearis (Hassall) var. inarmata (Hincks) - (2280, p102)
Dist: Queen Charlotte Islands to west side of Santa Catalina dredged in 45 fms (2286, p291)
Coll: Puget Sound: San Juan Channel off Point Caution, 40-45m (2280, p102)

Schizoporella longirostrata Hincks - (2286, p291)
Dist: Queen Charlotte Islands to Calif. (2286, p292)
Coll: Calif: San Pedro and Catalina Islands (2286, p292)

Schizoporella tumulosa Hincks - (2280, p102)
Dist: Friday Harbor, and San Juan Channel off Point Caution Puget Sound, Wash. (2280, p102) to San Pedro and San Diego, Calif. (2285, p294)
Hab: 40-45m (2280, p102)

Scruparia ambigua (d'Orbigny), 1841 - (2281, p16)
Dist: B.C. to southern Calif. (2281, p16)
Coll: B.C.: Union Bay, Vancouver Islands region (2281, p16)
Hab: From low tide mark down to 150 fms (2281, p16)

ECTOPROCTA - CHEILOSTOMATA

Scrupocellaria californica Trask, 1857 - (2033, p282)
Dist: B.C. (2281, p136) to central Calif. (2033, p282)
Coll: Puget Sound: Friday Harbor and Griffin Bay, 15-23m (2280, p98); Ore: Cape Arago (2281, p136)
Hab: Intertidal (2033, p282)

Scrupocellaria diegensis Robertson, 1905 - (2281, p137)
Dist: Southern B.C. to San Diego, Calif. (2281, p137)

Scrupocellaria varians Hincks, 1882 - (2281, p149) (2280, p98)
Dist: Queen Charlotte Islands to La Jolla, Calif. (2285, p261)
Coll: Puget Sound: Copalis Rocks, Channel Rocks, San Juan Channel off Point Caution (2280, p98)
Hab: Low tide to 45m (2280, p98)

Smittina sp. - (2033, p282)
Dist: Central Calif. coast (2033, p282)
Hab: Intertidal (2033, p282)

Smittina landsborovii (Johnston) - (2280, p104) (2282, p400)
Dist: Puget Sound (2280, p104) to Galapagos Islands (2282, p401)
Coll: Puget Sound: Friday Harbor, Griffin Bay and San Juan Channel off Point Caution, 40-45m (2280, p104); Ore: (2282, p401)
Hab: Cosmopolitan (2282, p401)

Smittina spathulifera (Hincks), 1884 - (2282, p401)
Dist: Houston-Stewart Channel, B.C. to Natividad Island off lower Calif. (2282, p402)
Coll: 27°44'17"N, 115°14'20"W at 66 fms (2282, p402)

Smittina trispinosa (Johnston) - (2280, p105)
Dist: Alaska to San Diego (2280, p105)
Coll: B.C.: Queen Charlotte Islands (2286, p303); Puget Sound: Friday Harbor, and San Juan Channel off Point Caution, 40-45m (2280, p105)
Hab: Intertidal to a depth of a few fms (2286, p303)

Stephanosella biaperta (Michelin, 1845) - (2033, p282)
Dist: B.C. to central Calif. (2033, p282) (2282, p369)
Coll: Puget Sound: San Juan Channel off Point Caution, 40-45m (2280, p102)
Hab: Intertidal (2033, p282)

ECTOPROCTA - CHEILOSTOMATA

Stirparia occidentalis, Robertson, 1905 - (2285,p280)
Dist: Puget Sound to coast of Calif. (2285, p281)

Tegella armifera (Hincks), 1880 - (2281,p79)
Dist: Point Barrow, Alaska to San Pedro, Calif. (2281,p80)

Tegella robertsonae O'Donoghue, 1926 - (2033,p282)
Dist: Southern Alaska to southern Calif. (2281,p82)
Coll: Central Calif. (2033,p282)
Hab: Intertidal (2033,p282)

Tegella unicornis (Fleming), 1828 - (2281,p78)
Dist: Point Barrow, Alaska to southern Calif. (2281,p79)
Coll: B.C.: Houston-Stewart Channel (2281,p79)

Tricellaria occidentalis (Trask), 1857 - (2281,p122) (2033,p282)
Dist: B.C. to southern Calif. (2281,p122)
Coll: Wash: Cape Flattery (2281,p122); Calif: Santa Barbara (2281,p122)
Hab: Intertidal (2033,p281)

Tricellaria ternata (Solander), 1786 - (2281,p123)
Dist: Alaska to Land's End, Calif. (2281,p123)

Triticella elongata (Osburn, 1912) - (2033,p281)
Dist: Central Calif. coast (2033,p281)
Hab: On legs of various crabs; because of transparency and insensitivity to handling, it is superb class material (2033,p281)

Trypostega claviculata (Hincks), 1884 - (2282,p281)
Dist: B.C. to southern Calif. (2282,p281)
Coll: B.C.: Houston-Stewart Channel, and Cumshewa (2282,p281); Calif: Point Loma, Santa Rosa Island, off Santa Catalina Island, and off San Pedro, all from shallow water to 40 fms (2282,p281)

PHYLUM PHORONIDA

Phoronopsis harmeri Pixel - (2996,p102)
P. viridis Hilton is obsolete nomenclature for this species.
Dist: Vancouver Island to southern Calif. (2996,p104)
Coll: B. C.: Departure Bay, Strait of Georgia; Wash: coast (2996,p103); Calif: Elkhorn Slough, Bolinas Lagoon, Tomales Bay, Bodega Bay (2033,p283)
Hab: Intertidal flats (2033,p283), substrate of mixed sand and mud (2996,p104)

Phoronis hippocrepia - (2996,p91)
Dist: B. C. to Calif. (2996,p91)
Coll: B. C.: Departure Bay; Wash: Puget Sound, San Juan Island, Garrison Bay, Jaekyll's Lagoon (2996,p91)
Hab: On sandstone near low tide level in relatively quiet water; on limestone in quiet, rather muddy water; in limestone exposed to wave action and considerable tidal range (2996,p91)

Phoronis vancouveronsis Pixel
Dist: Vancouver Island, B. C. (2033,p283) to Calif. (2996,p91)
Coll: Wash: San Juan Island (2996,p91)

PHYLUM BRACHIOPODA

Laqueus californicus (Koch, 1847) - (3003,p17)
Dist: Oregon to California
Coll: Ore: 100-800m (3003,p17)

Terebratalia transversa Sowerby - (2031,p123)
Dist: Puget Sound (2031) to central Calif., deep water; intertidal further north (2033,p284)
Hab: Rocky beaches; low water to considerable depth (2031,p123)

BRACHIOPODA

Terebratulina unguicula (Carpenter) - (2031, pl 25)
Hab: Attached to solid objects (2031, pl 25)

PHYLUM SIPUNCULOIDEA

Dendrostomum dyscritum Fisher, 1952 - (2033, pl 11)
Coll: Central Calif. coast (2033, pl 11)
Hab: In sand among rocks (2033, pl 11)

Dendrostomum perimeces Fisher, 1928 - (2033, pl 11)
Coll: Central Calif. coast (2033, pl 11)
Hab: Found in mud flats (2033, pl 11)

Dendrostomum pyroides Chamberlin, 1919 - (2033, pl 10)
Dendrostoma petraeum Fisher, 1928 is a synonym (2033, pl 10)
Coll: Central Calif. coast (2033, pl 10)
Hab: Generally in crevices of granite (2033, pl 10)

Golfingia hespera (Chamberlin, 1919) - (2033, pl 11)
Coll: Central Calif. coast (2033, pl 11)
Hab: Intertidal (2033, pl 11)

Phascolosoma agassizii Keferstein, 1866 - (2033, pl 11)
Coll: Central Calif. coast (2033, pl 11)
Hab: Commonest sipunculid in central Calif., intertidal, in rock crevices, shells, holdfasts, etc. (2033, pl 11)

Phascolosomum exasperatum Stimpson
Coll: Puget Sound (2050, pl 59)

Siphonosoma ingens (Fisher, 1947) - (2033, pl 11)
Coll: Central Calif. coast (2033, pl 11)
Hab: Most northern record, Elkhorn Slough (2033, pl 11)

Sipunculus nudus Linnaeus, 1766 - (2033, pl 11)
Dist: Puget Sound (2031, p97) to central Calif. coast (2033, pl 11)
Hab: Subtidal, occasionally washed ashore (2033, pl 11); sand or mud along rocks (2031, p97)

PHYLUM ECHIUROIDEA

Listriolobus pelodes Fisher, 1946 - (2033,p109) (2098)
Coll: Central Calif. coast (2033,p109)
Hab: Rare (2033,p109)

Urechis caupo Fisher and MacGinitie, 1928 - (2033,p109) (2100) (2099)
Dist: Oregon to southern Calif.
Coll: Not on Oregon coast until 1969
Hab: Forms permanent burrows in muddy sand, locally common (2033,p109) (2098)
Desc: (2099)
Natural History: (2100)
Respiratory Function: (2101)

PHYLUM ANNELIDA

Class: POLYCHAETA

Abarenicola pacifica Healy and Wells, 1959 - (3677,p409)
Dist: Alaska to Humbolt Bay, Calif. (3677,p409)
Hab: Intertidal, in sand (3677,p409)

Abarenicola vagabunda oceanica Healy and Wells, 1959 - (3677,p411)
Dist: Alaska to Humbolt Bay, Calif. (3677,p411)
Hab: Intertidal, in sand (3677,p411)

Aedicira--see also Aricidea

Aedicira antennata (Annenkova, 1934) - (3677,p51)
Dist: Chukchi Sea, B.C. to southern Calif. (3677,p51)
Hab: In slope, basin and canyon depths, in mud (3677,p51)

Amage anops (Johnson, 1901) - (2394,p42)
Dist: Alaska to southern Calif. (2394,p42)
Coll: Wash: Puget Sound (3677,p521), Stations 1497, 1498 (2394,p42)
Hab: In shelf and canyon depths, in mud (3677,p521)

ANNELIDA - POLYCHAETA

Amblyosyllis sp. - (3678,p397)
Dist: B. C. to central Calif. (3678,p397)
Hab: Associated with siliceous sponge (3678,p397)

Ammochares fusiformis (Delle Chiaje) - (2559,p42)
Dist: Alaska to Calif. , cosmopolitan (2559,p43)

Ammotrypane aulogaster Rathke, 1843 - (2033,p91)
Dist: Alaska to Mexico (3677,p319)
Hab: Intertidal (2033,p91), to shelf and canyon depths, in silty mud (3677,p319)

Ampharete acutifrons (Grube) - (2398,p44)
Dist: Puget Sound, Wash. to Monterey Bay, Calif. (2398,p44) (3677,p237)
Hab: 750-766 fms, green mud, sand (3677,p537)

Ampharete arctica Malmgren - (2559,p65)
Dist: Alaska to southern Calif. (3677,p539) (2559,p66)
Hab: Longshore, in mixed sediments; in shelf to abyssal depths; cosmopolitan (3677,p539)

Ampharete goësi Malmgren 1866 - (2559,p66)
Dist: B. C. to Santa Monica Bay, Calif. (3677,p541)
Hab: In 51.8m, in silt; shelf depths (3677,p541)

Amphicteis glabra Moore, 1905 - (3677,p545)
Dist: Alaska to southern Calif. (3677,p545)
Hab: In shelf depths in mud or sandy mud (3677,p545)

Amphicteis mucronata Moore, 1923 - (2559,p69)
Dist: B. C. to southern Calif. (2559,p69) (3677,p547)
Hab: Shelf, basin, canyon, and slope depths in green mud (3677,p547)

Amphicteis scaphobranchiata Moore 1906 - (2559,p68)
Dist: B. C. to Calif. (2559,p69) (3677,p549)
Hab: Shelf, slope, canyon, basin, abyssal depths in mud and mixed sediments (3677,p549)

ANNELIDA - POLYCHAETA

Amphisamytha bioculata (Moore, 1906) - (2559,p73)
Dist: B.C. to southern Calif. (3677,p551)
Hab: In shelf and canyon depths, in mud (3677,p551)

Amphitrite robusta Johnson, 1901 - (2033,p106)
Dist: Alaska to southern Calif. (2394)
Coll: Ore: Coos Bay region, Yaquina Bay (2394); Calif: central (2033,p106)
Hab: Intertidal (2033,p106), under rocks (2394)

Antinoe macrolepida Moore - (2558,p14)
Dist: Alaska to Calif. (2558,p14)

Antinoella macrolepida (Moore, 1905) - (3678,p41)
Dist: Alaska to Monterey Bay (3678,p41)
Hab: In 75-108 fms (3678,p41)

Anaitides groenlandica (Oersted, 1843) - (3678,p255)
As *Phyllodoce* - (2558,p46)
Dist: Arctic and subarctic regions, south to southern Calif. (3678,p225)
Coll: B.C., Oregon
Hab: In shelf to slope depths in silt and mud (3678,p225)

Anaitides madeirensis (Langerhans, 1880) - (3678,p231)
Phyllodoce (A.) madeirensis Langerhans - (2558,p45)
Dist: B.C. to southern Calif. (2558,p45)
Coll: Oregon, Calif: southern Calif. (3678,p231)
Hab: In shallow depths, in rocky or mixed sediments; cosmopolitan, in littoral depths (3678,p231)

Anaitides mediapapillate (Moore, 1909) - (2033,p94)
Dist: Alaska to Panama (2394)
Coll: Ore: Coos Bay and offshore 60-75 fms (2394); Calif: (2033,p94), Monterey Bay (3678,p233)
Hab: Intertidal (2033,p94), in littoral depths, in rocky and mixed sediments (3678,p233)

Anaitides mucosa (Oersted, 1943) - (2033,p94)
Phyllodoce (Anaitides) mucosa Oersted - (2558,p46)
Dist: Alaska to Calif. (2558,p46)
Coll: B.C.: East and west coast Vancouver Island; Calif: central and southern (2033,p94) (3678,p235)
Hab: Intertidal (2033,p94), in shelf and slope depths, in mud and mixed sediments (3678,p235)

ANNELIDA - POLYCHAETA

Anaitides williamsi Hartman, 1936 - (2033,p94)
Dist: Oregon to California (2394,p11) (3678,p237)
Coll: Ore: Coos Bay (2394,p11); Calif: (2033,p94), Dillon Beach (2394,p11), Tomales Bay (3678,p237)
Hab: Intertidal (2033,p94) and offshore (2394,p11), in silty sediments (3678,p237)

Anobothrus gracilis (Malmgren), 1866 - (2394,p42)
Anobothrus gracilis Levinsen - (2559,p67)
Dist: Circumboreal, recorded from Calif. (2394,p42)
Coll: Ore: Cape Arago (2394,p42)

Apomatus timsii Pixell, 1912 - (3677,p747)
Dist: B. C. to Monterey, Calif. (3677,p747)
Hab: In shelf depths, in mud with sponge or rocks (3677,p747)

Aphrodita japonica Marenzeller, 1879 - (3677,p21)
Aphrodite japonica Maren. 1879 - (2558,p7)
Dist: Alaska to Ecuador (2558,p8) (3678,p21)
Hab: Usually in moderate depths on muddy bottoms (2558,p8); shallow depths to 75 fms (3678,p21)

Aphrodita longipalpa Essenberg 1917 - (3678,p23)
Aphrodite longipalpa Essenberg 1917 - (2558,p6)
Dist: B. C. to southern Calif. (3678,p23) (2558,p7)
Hab: In deep water (3678,p23)

Aphrodita negligens Moore, 1905 - (3678,p25)
Aphrodite negligens Moore - (2558,p8)
Dist: B. C. to Calif. (3678,p25) (2558,p8)
Hab: In deep water (3678,p25)

Aphrodita parva Moore, 1905 - (3678,p27)
Aphrodite parva Moore - (2558,p7)
Dist: Alaska to Mexico (3678,p27)
Coll: Oregon
Hab: 3-667 fms (2558,p7) (3678,p27)

Aphrodita refulgida Moore, 1910 - (2394,p4)
Dist: Central and southern Calif. (2394,p4) (3678,p29)
Coll: Oregon
Hab: Dredged in 20-59 fms, in sand and mud (2394,p4), subintertidal to 51 fms (3678,p29)

ANNELIDA - POLYCHAETA

Apistobranchus ornatus Hartman - (2398,p23)
Dist: Puget Sound to southern Calif. (3677,p83) (2398,p24)

Apomatus geniculata Moore - (2559,pl29)
Dist: B. C. to Calif. (2559,pl29)

Apomatus timmsii Pixell - (2559,pl28)
Dist: B. C. to Calif. (2559,pl29)

Arabella iricolor (Montagu, 1804) - (2033,p77)
Dist: B. C. to Mexico (3678,p789)
Coll: Ore: Coos Bay region (2394,p25); Calif: central (2033,p77)
Hab: Intertidal at shelf depths, in mixed sediments (3678,p789)

Arabella semimaculata (Moore, 1911) - (2033,p77)
Dist: Central and southern Calif. (3678,p793) (2033,p77)
Hab: In rocky and mixed sediments, 10 fms (3678,p793)

Arctonoe fragilis (Baird, 1863) - (2033,p96)
Dist: Alaska to Mexico (3678,p45)
Coll: Ore: Coos Bay region (2394), southern bay Cape Blanco; Calif: central (2033,p96)
Hab: Commonly commensal on Evasterias, rarely on Pisaster giganteus (2033,p96), on Leptasterias aqualis (2394), associated with echinoderms (3678,p45),25-150 fms (3678,p45)

Arctonoe pulchra (Johnson, 1897) - (2033,p96)
Dist: Alaska to Mexico (3678,p47)
Hab: Commensal on sea cucumber Stichopus (2033,p96), key hole limpet (3678,p47), intertidal or in shallow depths (3678,p47)

Arctonoe vittata (Grube, 1855) - (2033,p96)
Dist: Alaska to southern Calif. (2394,p6) (2583,p65) (3678,p49)
Coll: Ore: Coos Bay, Depoe Bay, Brookings (2394,p6)
Hab: Commensal on keyhole limpet Diodora aspera (2033,p96) and on Cryptochiton, Diodora and Dermastia (2583,p65); free-living and commensal; hosts include: Crytochiton stelleri, Punchirella, Diodora, Stichopus, Sloaster, Pisaster, Crossaster, Dermasterias, Acmaea, Henricia (2558,pl21)

ANNELIDA - POLYCHAETA

Arctonoe vittata (Grube, 1855) - continued
Food: Detritus feeders (2558,p123)
Life Cycle: Planktonic larva (2558,p123)

Arenicola cristata Stimpson, 1856 - (2033,p78)
Dist: Humbolt Bay to southern Calif. (2033,p78) (3677,p415)
Hab: Intertidal sand (3677,p415)

Arenicola marina (Linnaeus, 1761) - (2394,p39)
Dist: B. C. to Chile (2394,p39)
Coll: Ore: Yaquina Bay (2394,p39)

Arenicola pusilla Quatrefages, 1866 - (2033,p78)
Dist: Alaska to Chile (2394,p39)
Coll: Ore: Coos Bay region (2394,p39); Calif: central (2033,p78)
Hab: Intertidal (2033,p78)

Aricia michaelsensi Ehlers - (2559,p96)
Dist: West coast Vancouver Island to Strait of Magellan; Falkland Islands, littoral (2559,p96)
Coll: Oregon

Aricidea jeffreysii (McIntosh) - (2559,p39)
Dist: East coast of Vancouver Island, dredged in 20-230 fms; Howe Sound dredged in 120 fms (2559,p40)
Coll: Oregon

Aricidea longicornuta Berkeley - (2559,p38)
Dist: East coast Vancouver Island (2559,p38)
Coll: Oregon
Hab: Dredged in 75-230 fms (2559,p38)

Aricidea lopezi (Berkeley and Berkeley, 1956) - (3677,p59)
Dist: Western Canada to southern Calif. (3677,p59)
Coll: Wash: Lopez Island (3677,p59)
Hab: In slope, canyon and basin depths, in mud (3677,p59)

Aricidea neosuecica (Hartman 1965) - (3677,p63)
Dist: Oregon to southern Calif. shelf; canyon depths (3677,p63)

ANNELIDA - POLYCHAETA

Aricidea (*Aricidea*) *ramosa* Annenkova - (2398,p21)
Dist: Puget Sound to southern Calif. (2398,p21-22)
Coll: Oregon

Armandia bioculata Hartman, 1938 - (2033,p91)
Dist: Alaska to Calif. (2394)
Coll: Ore: Coos Bay region, Bandon to Cape Blanco (2394); central Calif. (2033,p91)
Hab: Intertidal (2033,p91), and shelf depths, in silty sand and mud (3677,p323)

Armandia brevis (Moore, 1906) - (2033,p91)
Dist: Oregon; central Calif. coast (2033,p91)
Hab: Intertidal (2033,p91)

Artacama coniferi Moore, 1905 - (2394,p43)
Artacama coniferi fera - (2559,p74)
Dist: Alaska to southern Calif. (2394,p44)
Coll: Washington; Ore: off Coos Bay, 20-40 fms (2394,p43)
Hab: In slope and basin depths, in green mud (3677,p585)

Asabellides lineata (Berkeley and Berkeley 1943) - (3677,p559)
Dist: B. C. to southern Calif. (3677,p559)
Hab: In shelf depths, in sandy silt (3677,p559)

Asychis disparidentata (Moore, 1904) - (2559,p46)
Dist: B. C. to southern Calif. (3677,p423)
Coll: Oregon
Hab: In shelf and canyon depths; in coarse sand, shelly mixed bottoms and mud (3677,p423)

Asychis similis (Moore) - (2559,p46)
Dist: Alaska to Calif. (2559,p46)
Coll: Oregon

Autolytus, spp. - (2394,p13)
Coll: Coos Bay channel in Oregon (2394,p13)
Hab: Dock on hydroids, in plankton (2394,p13)

ANNELIDA - POLYCHAETA

Autolytus magnus Berkeley - (2558,p70)
Dist: Atokous phase known only from Alaska, dredged in 15-40 fms; Epitokes (both sexes) from west and east coasts Vancouver Island and Cape Mudge, in plankton (2558,p70)

Autolytus prismaticus (Muller, 1776) - (2394,p13)
Dist: Circumpolar to boreal (2394,p13)
Coll: Ore: Yaquina Bay (2394,p13)

Autolytus varius Treadwell, 1914 - (2033,p105)
Dist: B.C. to central Calif. (3678,p403) (2033,p105)
Hab: Intertidal (2033,p105); in rocky habitats (3678,p403)

Axiothella rubrocincta (Johnson, 1901) - (2394,p37)
Dist: B.C. to southern Calif. (2394,p37)
Coll: Wash: Puget Sound; Oregon
Hab: Intertidal and shelf depths in sand (3677,p431), from roots of eel grass (2394,p37)

Boccardia columbiana (Berkeley, 1927) - (3677,p91)
Polydora (Bocardia) columbiana
Dist: B.C. to central Calif. (3677,p91)
Hab: In intertidal sands, and boring in hard shells and wood (3677,p91), littoral, usually in minute galleries in shaley rock (2550,p16)

Boccardia polybranchia (Haswell, 1885) - (3677,p93)
Polydora (Baccardia) polybranchia Haswell - (2559,p16)
Dist: B.C. and Morro Bay to estuarine, Calif. (3677,p93)
Coll: Oregon
Hab: In cosmopolitan areas, especially in estuarine and tidal streams; in silt and mud (3677,p93); littoral (2559,p17)

Boccardia proboscidea Hartman, 1940 - (2033,p102)
Polydora (Boccardia) proboscidea Hartman - (2559,p17)
Dist: B.C. to Calif. (2394)
Coll: B.C.: west coast Vancouver Island (2559,p18); Ore: Coos Bay region (2394); Calif: Casper, intertidal in shales (3677,p95) (2033,p102)
Hab: In rock crevices in high tide pools; usually only 2 tentacles are visible (2033,p102); intertidal, boring in shaley rocks, and in *Mytilus* colonies (3677,p95); littoral (2559,p18)

ANNELIDA - POLYCHAETA

Boccardia uncata (Berkeley), 1927 - (2033,p102)
Polydora (*Boccardia*) *uncata* Berkeley - (2559,p14)
Dist: B. C. (3677,p103) to central Calif. (2033,p102)
Coll: Oregon
Hab: Intertidal (2033,p102), in oyster clumps, burrowing in outer shells causing crescentic runways (3677,p103); in sandy tubes both free and associated with the calcareous tubes of the cirratulid *Dodecaceria pacifica* (Fewkes) (2559,p15)

Brada pilosa (Moore) - (2559,p8)
Dist: Gulf of Georgia in 1903 only (2559,p8)
Coll: Oregon

Brada sachalina Annenkova - (2398,p40)
Coll: Puget Sound, Wash. (2398,p40)

Brada villosa (Rathke, 1843) - (3677,p281)
Dist: Alaska to southern Calif. (3677,p281)
Coll: Ore: Coos Bay region, 20-40 fms (2394)
Hab: In slope to basin depths, in mud and mixed sediments (3677,p281)

Branchiomaldane vincenti Langerhans, 1881 - (2394,p39)
Dist: B. C. to southern Calif. (3677,p417)
Coll: Ore: Cape Arago (2394)
Hab: Single individuals come from stations 1477 and 1491, washed from roots of eel grass (2394,p39); intertidal (3677,p117)

Branchiomma burrardum Berkeley - (2559,p110)
Dist: B. C. to Calif. (2559,p111)
Coll: Oregon

Callizona angelini (Kinberg) - (2558,p38)
Dist: Alaska to B. C. (2558,p41)
Coll: Oregon (Authors)

ANNELIDA - POLYCHAETA

Capitella capitata (Fabricius, 1780) - (2033,p79)
Dist: Alaska to southern Calif. (2394) (3677,p361)
Coll: Ore: Coos Bay region, 35 miles off Depoe Bay 60-74 fms (2394); Calif: central (2033,p79)
Hab: Intertidal and estuarine mudflats, cosmopolitan (3677,p361)

Capitella capitata ovincola Hartmen, 1947 - (2033,p79)
Dist: Monterey Bay and southern Calif. (3677,p365)
Hab: In squid egg jelly (2033,p79); in shelf and canyon depths (3677,p365)

Caulleriella alata (Southern) 1914 - (2559,p36)
Dist: B. C. to southern Calif. (3677,p225)
Coll: Wash: Puget Sound (2388,p30); Oregon
Hab: In shelf depths, in mixed sediments (3677,p225)

Caulleriella annulosa (Hartman) - (2398,p31)
Dist: Puget Sound (2398,p31); Oregon

Caulleriella hamata (Hartman, 1948) - (3677,p231)
Dist: Alaska to southern Calif. (3677,p231)
Hab: In shallow depths in silt and mixed sediments (3677,p231)

Caulleriella pacifica (Berkeley, 1929) - (2033,p82)
Dist: B. C.; intertidal on central Calif. coast (2033,p82)

Ceratonereis paucidentata (Moore, 1903) - (3678,p507)
Dist: Alaska to southern Calif. (3678,p507)
Hab: In slope depths, in black sand (3678,p507)

Chaetopterus variopedatus (Renier, 1804) - (2033,p79)
Dist: Oregon (2394,p33) to southern Calif. (3677,p209)
Coll: Calif: Off Whites Point and offshore islands (3677,p209)
Hab: In sand (2033,p79), tube builders, intertidal and shallow water (2394,p33), in estuarine and shelf depths, in sandy mud and mixed sediments; cosmopolitan (3677,p209)

ANNELIDA - POLYCHAETA

Chaetozone gracilis (Moore, 1923) - (2398,p35)
Dist: Puget Sound (2398,p35) to southern Calif. (3677,p237)

Chaetozone setosa Malmgren, 1867 - (2559,p35)
Dist: B. C. to California; Atlantic and Pacific Oceans, cosmopolitan (3677,p241)
Coll: Wash: Puget Sound (2398,p36); Oregon
Hab: In littoral zones to 556m, in silty sediments (3677,p241)

Chaetozone spinosa Moore, 1903 - (2398,p36)
Dist: Puget Sound (2398,p36) to southern Calif. (2398,p37) (3677,p243)
Hab: In slope and basin depths, in mud (3677,p243)

Cheilonereis cyclurus (Harrington, 1897) - (2033,p88)
Dist: Alaska to Calif. (2394) (3678,p511)
Coll: Ore: Cape Blanco, Depoe Bay (2394); Calif: central (2033,p88)
Hab: Intertidal (2033,p88), commensal with hermit crabs and *C. magister*; with crabs and pagurids (3678,p511)

Chitinopoma groenlandica (Morch, 1863) - (2559,p129)
Dist: B. C. to Calif. (3677,p749)
Hab: In shelf and slope depths in mud and sand with rocks (3677,p749)

Chloeia pinnata Moore, 1911 - (2394,p9)
Dist: Coos Bay, Oregon to southern and lower Calif. (2394,p9)
Coll: Ore: Coos Bay (2394,p9), Newport
Hab: Common in shallow depths, 10-50 fms, on sandy bottoms, 57-480m (3678,p193)

Chone bimaculata Banse and Nichols - (2991,p227)
Coll: Wash: 47°10'48:N, 122°50'W; 15-37m, on medium sand (2991,p227)

Chone ecaudata (Moore) - (2559,p124)
Dist: B. C. to Calif. (2559,p124)

ANNELIDA - POLYCHAETA

Chone gracilis Moore, 1906 - (2559,pl23)
Dist: Alaska (2559,pl24) to southern Calif. (3677,p665)
Coll: Oregon
Hab: In 35-188 fms, rocks and broken shells (3677,p665)

Chone infundibuliformis Kröyer, 1856 - (2559,p123)
Dist: Alaska to southern Calif. (2559,p123)
Hab: Inhabits rocky habitats with muddy crevices (3677,p667)

Chone mollis (Bush, 1904) - (2033,p98)
Dist: Oregon to southern Calif. (2394) (3677,p673) (2033,p98)
Coll: Ore: Coos Bay
Hab: Intertidal (2033,p98), in shelf depths, especially in enclosed bays (3677,p673)

Cirratulus cirratus (O. F. Muller, 1865) - (2033,p81)
Dist: B.C. to southern Calif. (3677,p245)
Coll: Ore: Coos Bay region (2394,p34); Calif: central (2033,p81)
Hab: Cosmopolitan, intertidal, shallow depth, in mud and rock associations (3677,p245) (2394,p34)

Cirratulus cirratus cingulatus Johnson, 1901 - (3677,p247)
Dist: Northeast Pacific to central Calif. (3677,p247)
Coll: Puget Sound, Wash., intertidal (3677,p247)
Hab: In intertidal zones, in rocky habitats (3677,p247)

Cirratulus cirratus spectabilis (Kinberg, 1866) - (3677,p249)
Dist: Alaska to central Calif. (3677,p249)
Hab: In intertidal zones, in mixed sediments (3677,p249)

Cirratulus spectabilis (Kinberg) - (2559,p32)
Dist: B.C. to Calif. (2559,p33)
Coll: Oregon
Hab: Common between tide marks (2559,p33)

Cirriformia spirabrancha (Moore, 1904) - (2033,p82)
Dist: Central and southern Oregon to southern Calif. (2394,p34) (3677,p253)
Coll: Ore: Coos Bay region (2394,p34)
Hab: Abundant in protected bays, burrowing in sand or mud leaving only greenish tentacles exposed (2033,p82); estuarine and intertidal muddy bottoms to 12.5 fms (3677,p253)

ANNELIDA - POLYCHAETA

Cistenides brevicoma (Johnson, 1901) - (2033,p93)
Pectinaria (Cistenides) brevicoma Johnson - (2559,p106)
Dist: B.C. to southern Calif. (3677,p513) (2559,p107)
Coll: B.C.: east and west coast Vancouver Island (2559,p107); Wash: off Puget Sound, 10 fms (3677,p513); Oregon; Calif: central (2033,p93)
Hab: Intertidal (2033,p93); in shelf depths to 90 fms; in gravel and sand (3677,p513)

Cossura longocirrata Webster and Benedict, 1887 - (2397,p204)
Dist: B.C. to southern California
Coll: Puget Sound, San Juan Archipelago, Wash. (2397,p197); also dredged on mud bottom at 15m in Massacre Bay, West Sound, Orcas Island (2397,p204); Oregon; (Authors)

Crucigera zygophora (Johnson, 1901) - (2033,p100)
Dist: B.C. to central Calif. (3677,p753)
Coll: Wash: Puget Sound (type loc.) (3677,p753); Calif: central (2033,p100)
Hab: Intertidal (2033,p100) in rocky habitats (3677,p753)

Ctenodrilus serratus (O. Schmidt, 1857) - (2559,p37)
Dist: B.C. to southern Calif. (2559,p38) (3677,p275)
Coll: Oregon
Hab: Intertidal; cosmopolitan (3677,p275)

Demonax medius (Bush, 1904) - (2559,p115)
Dist: Alaska to southern Calif. (3677,p675)
Coll: Oregon (2559,p115); Calif: (2559,p115) (3677,p675)
Hab: Intertidal and shelf depths, in rocky and mixed bottoms (3677,p675)

Dexiospira rugatus (Bush, 1904) - (3677,p787)
Dist: Sitka, Alaska to central Calif. (3677,p787)
Hab: Shelf depths, attached to hard surfaces (3677,p787)

Dexiospira spirillum (Linnaeus, 1758) - (2033,p100)
Dist: Alaska to southern Calif. (3677,p789)
Coll: Oregon (2394,p47); Calif: central (2033,p100)
Hab: Intertidal (2033,p100); on kelps and hard surfaces (3677,p789), cosmopolitan (2394,p47)

Dioptatra ornata Moore, 1911 - (2033,p90) (2558,p94) (3678,p659)
Dist: B.C. to Mexico (2033,p90) (3678,p659) (2558,p95)
Hab: Intertidal (2033,p90); in littoral depths, in mixed sediments (3678,p659)

ANNELIDA - POLYCHAETA

Distylia rugosa Moore - (2559,p112)
  Distylidia rugosa (Moore, 1904) - (3677,p677)
    Dist: B.C. to Calif. (3677,p677) (2559,p112)
    Hab: Intertidal and shelf depths, in rocky habitats; littoral (3677,p677)

Dodecaceria concharum Oersted, 1943 - (2559,p34)
    Dist: B.C. to southern Calif. (3677,p255)
    Hab: Intertidal rocky areas; cosmopolitan (3677,p255)

Dodecaceria pacifica (Fewkes) - (2559,p33)
  Dodecaceria fewkesi (Fewkes) - (3672,p326)
    Dist: B.C. to southern Calif. (3677,p257)
    Hab: Colonies of calcareous tubes on rock faces; intertidal (3762,p326); intertidal to 10 fms, in rocky habitats (3677,p257)
    Repro: Egg fertilization, egg development (3762,p330-334)
    Pigmentation: See (3762,p328-329)
    Regeneration: See (3762,p329)

Dodecaceria fistulicola Ehlers, 1901 - (2033,p82)
    Dist: B.C. to central Calif. coast (2394,p34) (2033,p82)
    Coll: Ore: Cape Blanco, Coos Bay region (2394,p34)

Dorvillea annulata (Moore) - (2558,p87)
    Dist: B.C. and Washington (2558,p87)

Dorvillea articulata (Hartman, 1938) - (2033,p82)
    Dist: Oregon to Calif. (2394) (2033,p82)
    Coll: Ore: Yaquina Bay and 2-5 fms (2394); Calif: Dillon Beach, intertidal in mixed sediments (3678,p817)
    Hab: Intertidal to 575m, in mixed sediments (3678,p817)

Dorvillea gracilis (Hartman, 1938) - (2033,p82)
    Dist: Oregon to central Calif. (2394,p25) (2033,p82)
    Coll: Ore: Coos Head (2394,p25)
    Hab: Intertidal (2033,p82)

Dorvillea neglecta (Fauvel) - (2558,p86)
    Dist: B.C. to Calif. (2558,p85)

Dorvillea pseudorubrovittata Berkeley, 1927 - (2394,p25) (2398,p21)
    Dist: Alaska to Oregon (2394,p25)
    Coll: Wash: Puget Sound (2398,p21); Ore: 35 miles west of Depoe Bay in 60-74 fms (2394,p25)

ANNELIDA - POLYCHAETA

Dorvillea rudolphii (Delle Chiaje) - (2558,p86)
Dist: B.C. to Oregon
Hab: Littoral (2558,p86)

Drilonereis falcata Moore, 1911 - (2033,p77)
Dist: Central Calif. to Mexico (2033,p77) (3678,p797); Oregon
Hab: Intertidal to slope depths, in mud, sand and mixed sediments (3678,p797)

Enipo cirrata Treadwell - (2558,p16)
Dist: Alaska to Oregon (2558,p17)
Coll: Oregon, Authors

Ephesia papillifer (Moore) - (2558,p27)
Dist: B.C. to Calif. (2558,p27)

Eteone longa (Fabricius, 1780) - (2033,p95) (2558,p41)
Dist: B.C. to central Calif. (2558,p41) (2033,p95)
Hab: Intertidal (2033,p95), littoral (2558,p41)

Eteone pacifica Hartman, 1936 - (2033,p95)
Dist: B.C. to Calif. (3678,p255)
Coll: Wash: (3678,p255); Ore: Cape Arago, Coos Bay (2394); Calif: central (2033,p95)
Hab: Intertidal (2033,p95), in littoral depths, silt (3678,p255)

Eteone spetsbergensis Malmgren var. *pacifica* - (2558,p42)
Dist: B.C. to Calif. (2558,p42)
Coll: Wash: Friday Harbor (2558,p42); Oregon

Eteonides coineaui difficilis, Banse, 1963 - (2397,p197)
Coll: Wash: Puget Sound, San Juan Archipelago (2397,p197)

Euchone analis (Kroyer) - (2559,p121)
Dist: Alaska to B.C. (2559,p122); Oregon (Authors)

Euclymene zonalis (Verril) - (2559,p48)
Dist: West coast Vancouver Island, littoral (2559,p49) to Oregon

Eudistylia polymorpha (Johnson, 1901) - (2033,p98)
Dist: Alaska to southern Calif. (3677,p687)
Coll: Calif: central (2033,p98)
Hab: The large and showy "feather-duster" worm; a rock-crevice dweller (2033,p98), intertidal in rocky sediments (3677,p687)

ANNELIDA - POLYCHAETA

Eudistylia vancouveri (Kinberg, 1967) - (2559,p113) (2033,p98) (3677, p689)
  Dist: Alaska to Calif. (2559,p113) (3677,p689)
  Coll: Ore: (2394,p46) (2559,p113); Calif: (2559,p113) (2033, p98)
  Hab: Attached to piles on floating rafts (2394,p46); intertidal in sandy mud flats and sandy silt (3677,p689) (2033,p98)

Eulalia aviculiseta Hartman, 1936 - (2033,p95)
  Dist: Oregon to central Calif. (2033,p95) (2394,p11) (3678,p259)
  Hab: Intertidal (2033,p95), on barnacles (2394,p11), in rocky areas with algal debris (3678,p259)

Eulalia (*Hypoelalia*) *bilineata* (Johnston, 1840) - (2398,p7) (2558,p48)
  Dist: Puget Sound, Washington (2398,p7) to southern Calif. (3678,p261)
  Hab: Littoral (3678,p261), in shelf depths, in muddy and mixed sediments, cosmopolitan (3678,p261)

Eulalia (*Eulalia*) *levicornuta* Moore, 1909 - (2398,p7)
  Dist: Puget Sound, Washington (2398,p7) to southern Calif. (3678,p263)
  Hab: In slope depths, in mud and gray sand (3678,p263)

Eulalia (*Pterocirrus*) *macroceros* (Grube) - (2991,p223) (2558,p48)
  E. (*Sige*) *macroceros* Berkeley and Berkeley, 1948 - (2991,p223)
  Coll: Seattle (mean depth 172-216m, silt); Nanaimo; San Juan Archipelago and Puget Sound, from the intertidal zone to 60m depth, from rocky and sandy bottoms, as well as from mud and algae (2991,p223)
  Hab: Littoral (2558,p48)

Eulalia nigrimaculata Moore - (2558,p49)
  Dist: B.C. to Calif. (2558,p49)

Eulalia quadrioculata Moore, 1906 - (2394,p11)
  Dist: Washington to Calif. (3678,p265) (2394,p11)
  Coll: Wash: Pt. Townsend (type loc.) (3678,p265); Ore: Coos Head in mussel beds (2394,p11)
  Hab: Occurs in *Mytilus* colonies, intertidal (3678,p265)

Eulalia (*Eumida*) *sanguinea* (Oersted)- (2558,p47)
  See *Eumida*

Eulalia viridis (Muller) - (2558,p48)
  Eulalia viridis (Linnaeus, 1767) - (3678,p267)
  Dist: Alaska to central Calif. (2558,p49) (3678,p267)
  Hab: Intertidal depths, among rocks and kelps, cosmopolitan (3678,p267)

ANNELIDA - POLYCHAETA

Eumida longicornuta (Moore, 1906) - (3678,p273)
Dist: Washington to central Calif. (3678,p273)
Coll: Wash: Port Townsend (3678,p273); Oregon
Hab: Among serpulid tubes, in rocky habitats, intertidal (3678,p273)

Eumida sanguinea (Oersted, 1843) - (2033,p95)
Eulalia (Eumida) sanguinea (Oersted) - (2558,p47)
Dist: B.C. to southern Calif. (3678,p275) (2558,p48)
Coll: Ore: Coos Bay, 60-74 fms (2394,p11); Calif: central (2033,p95)
Hab: In shelf depths, usually in rocky or mixed bottoms, cosmopolitan (3678,p275) (2394,p11), intertidal (2033,p95)

Eunice biannulata Moore - (2558,p89)
Dist: B.C. to Calif. (2558,p90)
Hab: Intertidal and shelf depths (3678,p715)

Eunice kobiensis McIntosh - (2558,p90)
Dist: Alaska to Calif. (2558,p90)

Eunice longicirrata Webster, 1884 - (2033,p83)
Dist: East and west coast of North America (2394,p23)
Coll: Ore: Coos Bay region (2394,p23); Calif: central (2033,p83)
Hab: Intertidal (2033,p83), along shore (2394,p23)

Eunice valens (Chamberlin, 1919) - (3678,p719)
Coll: Mendocino, Calif. (3678,p719)
Hab: Perhaps intertidal (3678,p719)

Eunoe barbata Moore, 1910 - (2558,p14)
Dist: Alaska to Calif. (2558,p14) (3678,p55)
Hab: 40-1062 fms, or commensal with holothurian (3678,p55)

Eunoe nodosa (Sars, 1861) - (2394,p7)
Dist: East and west coasts of boreal America, and Europe (2394,p7)
Coll: Oregon (2394,p7)

Eunoe senta (Moore, 1902) - (2033,p96)
Dist: Alaska to southern Calif. (3678,p57)
Coll: Calif: central (2033,p96)
Hab: Intertidal (2033,p96), moderate depths to 45 fms (3678,p57)

Euphrosyne arctia Johnson - (2558,p29)
Euphrosine arctia Johnson 1897 - (3678,p207)
Dist: Alaska to Calif. (2558,p29)

ANNELIDA - POLYCHAETA

Euphrosyne bicirrata Moore - (2558,p28)
Euphrosine bicirrata Moore, 1905 - (3678,p211)
Dist: Alaska to Calif. (2558,p29) (3678,p211)

Euphrosyne hortensis Moore, 1905 - (2558,p29)
Dist: Alaska to Calif. (2558,p30)

Euphysora furcata Kramp - (2341)
Coll: Oregon (2341)

Eupolymnia congruens (Marenzeller, 1884) - (3677,p589)
Dist: Alaska to southern Calif. (3677,p589)
Hab: In slope depth (3677,p589)

Eupolymnia crescentis Chamberlin, 1919 - (2033,p106)
Dist: Alaska to western Mexico (2394,p45) (3677,p591)
Coll: Oregon (2394,p45); Calif: central coast (2033,p106),
Crescent City, intertidal (type loc.) (3677,p591)
Hab: Intertidal (2033,p106), and shelf depths, in mixed sediments
(3677,p591)

Eupolymnia heterobranchia (Johnson) - (2559,p88)
Dist: Alaska to Calif. (2559,p89)

Eurythoe complanata (Pallas, 1766) - (2033,p77)
Dist: Intertidal on central Calif. coast (2033,p77)
Hab: Usually in intertidal zones, in exposed places (3678,p195)

Eusyllis assimilis Marenzeller, 1875 - (2558,p84)
Dist: B.C. to Mexico (3678,p415) (2558,p84)

Eusyllis blomstrandi Malmgren, 1867 - (2558,p84) (2398,p15)
Dist: Northeast Pacific (3678,p417)
Coll: Wash: Puget Sound (2398,p15)
Hab: Both free and in sponge *Ectyodoryx parasitica* growing
on shells of *Pecten hindsi* (2558,p85)

Euzonus (Thoracophelia) mucronata (Treadwell, 1914) - (3677,p327)
Thoracophelia mucronata (Treadwell) - (2033,p91) (2394)
Dist: B.C. to San Diego, Calif. (3677,p327) (2394)
Coll: Ore: Cape Blanco, Coos Bay (2394,p36); Calif: Table
Bluff (2686,p32), central beaches (2033,p91)
Hab: In intertidal sand beaches (3677,p327) (2033) (2686,p32)
(2394,p36)

Exogone gemmifera, 1862 - (2394,p13)
Dist: B.C. to Mexico (2394,p13) (3678,p423)
Coll: Ore: Yaquina (2394,p13)
Hab: Intertidal and shallow depths; cosmopolitan (3678,p423)

ANNELIDA - POLYCHAETA

Exogone lourei Berkeley and Berkeley 1938 - (2558,p79)
Dist: B. C. to Mexico (2558,p79) (3678,p425)
Coll: Wash: Puget Sound (2398,p16)
Hab: In littoral depths (3678,p425)

Exogone verugera (Claparede) - (2558,p78)
Dist: B. C. to Mexico (2558,p78) (3678,p429)
Hab: Littoral (3678,p429)

Fabricia berkeleyi (Banse, 1956) - (3677,p691)
Dist: B. C. to Casper, Calif. (3677,p691)
Hab: In estuarine and intertidal muds (3677,p691)

Fabricia brunnea, new species - (3677,p693)
Dist: Nanaimo, B. C. to central Calif. (3677,p693)
Hab: Intertidal, in pools with sand bottom (3677,p693)

Fabricia minuta Berkeley - (2559,p120)
Dist: West coast Vancouver Island, littoral (2559,p120) to Oregon

Fabricia pacifica Berkeley - (2559,p121)
Dist: East coast Vancouver Island (2559,p121) to Oregon

Fabricia sabella (Ehrenberg) subsp. oregonica Banse, 1956 (2397,p205)
Dist: B. C. to central Calif. (2397,p205) (2559,p121) (3677,p697)
Coll: Wash: High intertidal zone in False Bay, San Juan Island (2397,p205); Calif: central (3677,p697)
Hab: In felt-like mats of algae which can become lukewarm from the sun during low tide (2397,p205), in estuarine mud; cosmopolitan, in enclosed bays, in mud (3677,p697)

Flabelliderma commensalis Moore, 1909 - (3677,p285)
Flabelligera commensalis Moore, 1909 - (2033,p84)
Dist: Oregon to central and southern Calif. (3677,p295)
Hab: Intertidal (2033,p84), on purple urchins; Palos Verdes slope, in 30-50 ft, on rocky and mixed bottoms, free living (3677,p285)

ANNELIDA - POLYCHAETA

Flabelligera infundibularis Johnson, 1901 - (2033,p84)
F. infundibuliformis Johnson, 1901 - Hartman and Reish (2394,p35)
Dist: Alaska to southern Calif. (3677,p291) (2394,p35)
Coll: Wash: Scow Bay, 6 fms (3677,p291); Ore: Coos Bay (2394,p35); Calif: central (2033,p84)
Hab: Intertidal (2033,p84), in 6-10 fms, in muddy bottoms (3677,p291)

Genetyllis castanea (Marenzeller, 1879) - (2033,p95)
Dist: B. C. to Mexico (2394) (3678,p281)
Coll: Ore: Coos Bay (2394); Calif: central (2033,p95)
Hab: Intertidal (2033,p95), in littoral depths, perhaps in mixed sediments (3678,p281)

Glycera alba (Muller, 1788) - (2033,p85)
Dist: Central Calif. (2033,p85)
Hab: Intertidal (2033,p85)

Glycera americana Leidy, 1855 - (2033,p85)
Dist: B. C. to Peru (3678,p613)
Coll: Ore: intertidal and 26-58 fms (2394,p20); Calif: central (2033,p85)
Hab: Intertidal (2033,p85); dredged (2394,p20); in littoral and slope depths, in mixed sediments (3678,p613)

Glycera capitata Oersted, 1843 - (2033,p85)
Dist: Oregon to central Calif. (2394) (2033,p85); Northern Hemisphere (2394)
Coll: Ore: Coos Bay, shallow to 40 fms (2394); Calif: central (2033,p85)
Hab: Intertidal (2033,p85), North temperate seas in cosmopolitan areas, in shelf and slope depths, in mud and mixed sediments (3678,p617)

Glycera dibranchiata Ehlers, 1868 - (3678,p621)
Dist: Central Calif. to Mexico (3678,p621)
Hab: Estuarine and intertidal to 31 fms; in mud, sand and mixed sediments (3678,p621)

Glycera gigantea Quatrefages 1865 - (2558,p37)
Dist: B. C. to southern Calif. (2558,p37) (3678,p623)
Hab: Intertidal, in sand (3678,p623)

ANNELIDA -POLYCHAETA

Glycera nana Johnson - (2558,p37)
Dist: Alaska to Calif. (2558,p38)

Glycera robusta Ehlers, 1868 - (2033,p85)
Dist: B. C. to Mexico (2394,p20) (3678,p627)
Coll: Oregon (2394,p20); Calif: (3678,p627), central (2033,p85)
Hab: Intertidal (2033,p85) and shelf depths, in gravelly sand (3678,p627)

Glycera tenuis Hartman, 1944 - (2394,p20)
Dist: Oregon to southern Calif. (3678,p631)
Coll: Calif: Institute Beach in sand, central Calif. (2394,p20) Dillon Beach (type loc.) intertidal, sand (3678,p631)
Hab: In intertidal and shelf depths, in sands (3678,p631)

Glycera tesselata Grube, 1863 - (2033,p85)
Dist: B. C. to southern Calif. (3678,p633) (2033,p85)
Hab: Intertidal (2033,p85) in sub-littoral depths (3678,p633)

Glycinde armigera Moore, 1911 - (2033,p86)
Dist: B. C. to Panama (2394,p21) (3678,p643)
Coll: Oregon (2394,p21); Calif: central (2033,p86), Clam Beach (2686,p32)
Hab: Intertidal (2033,p86), outer shores dredged (2394,p21), in low intertidal zones to 275 fms; in muddy and mixed sand flats (3678,p643)

Glycinde picta Berkeley - (2558,p35)
Dist: Alaska to B. C. (2558,p35)
Hab: Dredged in 8-30 fms (2558,p35)

Glycinde polygnatha Hartman, 1950 - (3678,p645)
Dist: Alaska to central Calif. (3678,p645)
Hab: In intertidal depths to 68 fms, in sandy muds (3678,p645)

Glyphanostomum pallescens (Theel, 1878) - (3677,p561)
Dist: B. C. to southern Calif. (3677,p561)
Hab: Muddy sand (3677,p561)

ANNELIDA - POLYCHAETA

Goniada annulata Moore - (2558,p32)
Dist: Alaska to Mexico (2558,p33) (3678,p651)
Hab: In deep to abyssal depths (3678,p651)

Goniada brunnea Treadwell, 1906 - (2033,p85)
Dist: Alaska to southern Calif. (3678,p653)
Coll: Ore: Coos Bay dredged (2394); Calif: central (2033,p85)
Hab: Intertidal (2033,p85) 20-40 fms (2394) in low intertidal depths to over 600 fms (3678,p653)

Goniada maculata Oersted - (2398,p19)
Dist: Kodiak Island and northwestern Pacific, Puget Sound (2398,p19)

Gyptis arenicola glabra (Hartman 1961) - (3678,p363)
Oxydromus arenicola glabra
Dist: Oregon to southern Calif.
Coll: Ore: off Newport (Authors)
Hab: Shallow soft bottom (3678,p363)

Gyptis brevipalpa (Hartmann-Schroder) - (2398,p12)
Dist: Puget Sound, Wash. to central America (2398,p13)

Halosydna brevisetosa Kinberg, 1855 - (2033,p96)
Dist: Alaska to Mexico (2394,p6) (3678,p63)
Coll: Ore: (2394,p6) Coos Bay; Calif: central (2033,p96)
Hab: Cosmopolitan (2033,p96), along shore and 60-74 fms (2394,p6), intertidal to 16 fms (3678,p63)

Haploscoloplos elongatus (Johnson, 1901) - (3677,p19)
Haploscoloplos elongata (Johnson, 1901) - (2033,p92)
Dist: Alaska to Calif. (2394,p26)
Coll: Wash: Puget Sound, intertidal (3677,p19); Ore: (2394,p26); Calif: central (2033,p92)
Hab: Intertidal (2033,p92), sandy beaches (2394) to 293 fms (3677,p19)

Haploscoloplos panamensis Monro, 1933 - (3677,p21)
Dist: Alaska to Panama (3677,p21)
Hab: In 6-25 fms, in sandy mud or mud (3677,p21)

ANNELIDA - POLYCHAETA

Haplosyllis sp. - (2033,p105)
Dist: Oregon to Calif. (2394,p14) (2033,p105)
Hab: Intertidal (2033,p105) in sponges (2394,p14)

Harmothoe fragilis (Moore, 1910) - (2398,p6)
Dist: Puget Sound, Wash., to Calif. (2398,p6)
Hab: 152-600 fms (3678,p75)

Harmothoe imbricata (Linnaeus, 1767) - (2033,p96)
Dist: B. C. to southern Calif. (3678,p79)
Coll: Ore: Coos Bay region (2394,p6); Calif: central (2033,p96)
Hab: Cosmopolitan in distribution (2033,p96) (2394,p6) found free living or commensal with terebellids (3678,p79)

Harmothoe lunulata (Delle Chiaje, 1841) - (2033,p96)
Dist: B. C. to Calif. (3678,p81)(2394,p7)
Coll: Ore: Coos Bay region (2394,p7); Calif: central (2033,p96)
Hab: Intertidal (2033,p96) free living or commensal with holothurians or other polychaetes (3678,p81)

Harmothoe triannulata Moore - (2558,p12)
Dist: Alaska to Calif. (2558,p12)

Hemipodus borealis (Johnson) - (2558,p36)
Dist: B. C. to San Diego (3678,p637)
Coll: Ore: Coos Bay region (2394,p20); Calif: central (2033,p85)
Hab: Intertidal in muddy sand and sandy gravel, in *Mytilus* associations (3678,p637)

Hesionura coineaui difficilis (Banse, 1963) - (3678,p285)
Dist: Washington to Farnsworth Bank, west of Santa Catalina Island, Calif. (3678,p285)
Coll: Wash: San Juan Island (3678,p285)
Hab: In shelf and slope depths, in coarse sand (3678,p285)

ANNELIDA - POLYCHAETA

Hesperonoe adventor (Skogsberg, 1928) - (2033,p96)
Dist: Alaska to Calif. (3678,p91)
Hab: Commensal in burrows of the echiuroid *Urechis caupo* (2033,p96) intertidal (3678,p91)

Hesperone complanata (Johnson, 1901) - (2394,p6) (2033,p96)
Dist: Puget Sound, Wash. (2394,p6) to Coronado, Calif. (3678,p93)
Coll: Puget Sound (3678,p93); Ore: Coos Bay (2394); Calif: central (2033,p96)
Hab: Intertidal (3678,p93), commensal in burrows of mud shrimp *Callianassa* (2033,p96) and (2394,p6)

Heteromastus filiformis (Claparede, 1864) - (2033,p79)
Dist: San Francisco to southern Calif. (3677,p377)
Hab: Intertidal, in silty and mixed sediments (3677,p377)

Heteromastus filobranchus Berkeley and Berkeley, 1939 - (2559,p103)
Dist: B. C. to southern Calif. (3677,p379)
Coll: Wash: (2559,p104); Calif: (2559,p104)
Hab: In shelf to canyon depths, in mud (3677,p379)

Hololepida magna Moore - (2558,p18)
Dist: Alaska and B. C. (2558,p18)

Hololepidella tuta (Grube, 1855) - (2394,p6)
Dist: Alaska to Washington (2394,p6)
Coll: Ore: 35 miles west of Depoe Bay in 60-74 fms (2394,p6)

Hyalinoecia juvenalis Moore, 1911 - (2033,p90)
Dist: Central Calif. to Panama (2033,p90) (3678,p667)
Hab: Subtidal, rarely washed in (2033,p90)

Hydroides uncinatus (Philippi, 1844) - (2033,p100)
Dist: Central Calif. coast (2033,p100)
Hab: Intertidal (2033,p100)

Hypoeulalia bilineata (Johnston, 1840) - (2033,p95)
Dist: Oregon (2394,p12) to central Calif. (2033,p95)
Hab: Intertidal (2033,p95) shore (2394,p12)

ANNELIDA - POLYCHAETA

Hypsicomus lyra Moore and Bush, 1904 - (3677,p703)
Dist: Central and southern Calif. (3677,p703)
Hab: In shelf depths, rocky habitats (3677,p703)

Idanthyrsus armatus Kinberg - (2559,p107)
Dist: Alaska to South America (2559,p108)

Idanthyrus ornamentatus Chamberlain, 1919 - (2394,p41)
Dist: Alaska to Calif. (2394,p41)
Coll: Ore: Cape Arago Stations 1464, 1487, 1492, 1497 (2394,p41); Calif: Mendocino (3677,p497)
Hab: Intertidal rocky habitats; reef building (3677,p497)

Isocirrus longiceps (Moore) - (2559,p47)
Dist: B. C. to Calif. (3677,p453)
Coll: Wash: Puget Sound (2398,p41)
Hab: In shelf and canyon depths, in rocky bottoms (3677,p453)

Kefersteinia cirrata (Kegerstein) - (2558,p58)
Dist: Nanaimo region and Queen Charlotte Islands, littoral (2558,p58); Oregon (Authors)

Lacospira borealis (Daudin), 1800 - (2394,p47)
Dist: Intertidal regions of both sides of the Americas (2394,p47)
Coll: Ore: Coos County, Squaw Island, North Bay, Middle Bay, South Bay (2394,p47)
Hab: Cosmopolitan (2394,p47), occurs commonly on under surfaces of rocks (2394,p47)

Laetmonice pellucida Moore, 1903 - (3678,p33)
Dist: Bering Sea to San Diego; Patton Escarpment (3678,p33)
Hab: Deep bottom (3678,p33)

Lagisca extenuata (Grube, 1840) - (3678,p101)
Dist: Alaska to southern Calif. (3678,p101)
Hab: In moderate abyssal depths (3678,p101)

Lagisca multisetosa Moore, 1902 - (2394,p7)
Dist: Alaska to Lower Calif., Mexico (2394,p7) (3678,p105)
Coll: Ore: 35 miles west of Depoe Bay in 60-74 fms (2394,p7)
Hab: Considerable depths (3678,p105)

ANNELIDA - POLYCHAETA

Langerhansia heterochaeta (Moore, 1909) - (3678,p435)
Dist: B. C. to southern Calif. (3678,p435)
Hab: In 25-400 fms, in green mud to gravelly sand with shells (3678,p435)

Laonice cirrata (Sars, 1861) - (2033,p102)
Dist: B. C. to San Diego (3677,p107)
Coll: Oregon (2394); Central Calif. (2033,p102)
Hab: Intertidal (2033,p102), sand with shells and gravel (2394), littoral in silty mud, cosmopolitan (3677,p107)

Lepidasthenia interrupta (Marenzeller, 1902) - (3678,p115)
Dist: Northern Calif. (3678,p115)
Hab: Slope depths (3678,p115)

Lepidasthenia longicirrata Berkeley, 1923 - (3678,p117)
Dist: B. C. to southern Calif. (3678,p117)
Hab: In slope depths, to 330m (3678,p117)

Lepidonotus caeloris Moore, 1905 - (2394,p5) (2033,p97)
Dist: Alaska to Mexico (2394,p5) (2033,p97)
Hab: Rocky crevices at low tidal level (2394,p5), free living, under rocks (2033,p97)

Lepidontus squamatus (Linnaeus, 1767) - (3678,p125)
Dist: Pacific Ocean (3678,p125)
Hab: In littoral zones, associated with rocky bottoms, cosmopolitan (3678,p125)

Loimia medusa (Savigny, 1818) - (2394,p44)
Dist: Oregon to southern Calif. (2394,p44) (3677,p601)
Coll: Ore: Off Coos Bay in 20-40 fms (2394,p44)
Hab: Intertidal depths, in shelly mud or sand, cosmopolitan in tropical and warm temperate latitudes (3677,p601)

Lumbrinereis bifurcata McIntosh - (2558,p99)
Dist: B. C. to Mexico (2558,p99)

Lumbrinereis brevicirra (Schmarda) - (2558,p100)
Dist: B. C. to Calif. (2558,p100)
Hab: Cosmopolitan (2558,p100)

ANNELIDA - POLYCHAETA

Lumbrinereis cruzensis Hartman - (2558,p98)
Dist: B. C. to Calif. (2558,p98)
Hab: Dredged in fine mud in about 20 fms (2558,p98)

Lumbrinereis inflata Moore - (2558,p97)
Dist: B. C. to Calif. (2558,p98)
Hab: Littoral and dredged (2558,p98)

Lumbrinereis luti Berkeley - (2558,p100)
Hab: Dredged in 10-20 fms in dense mud (2558,p100)

Lumbrinereis similabris Treadwell - (2558,p100)
Dist: Bering Sea to B. C. (2558,p100)
Coll: Oregon (Authors)
Hab: Dredged in about 20 fms (2558,p100)

Lumbrineris bicirrata Treadwell, 1929 - (2394,p24)
Dist: Washington to Mexico (2394,p24) (3678,p745)
Coll: Wash: Diamond Point, Friday Harbor (3678,p745);
Ore: 35 miles west of Depoe Bay, in 60-74 fms (2394,p24)
Hab: In shelf and slope depths, in mixed and muddy sediments (3678,p745)

Lumbrineris californiensis Hartman - (2398,p19)
Dist: Puget Sound to central and southern Calif. (2398,p19-20) (3678,p749)
Hab: In shelf and slope depths, in mud and sand (3678,p749)

Lumbrineris latreilli Audouin and Milne-Edwards, 1833 - (2033,p86)
Dist: Central Calif. to Peru (2033,p86) (3678,p761)
May occur farther north.
Hab: Intertidal (2033,p86), cosmopolitan in shelf and slope depth in mixed sediments (3678,p761)

Lumbrineris, near sarsi (Kinberg, 1865) - (2394,p25)
Coll: Ore: Brookings in sand under rocks (2394,p25)

Lumbrineris zonata (Johnson, 1901) - (2033,p86)
Dist: Alaska to southern Calif. (2394) (3678,p777)
Coll: Wash: Salmon Bay, Puget Sound (3678,p777);
Ore: (2394,p24); central Calif. (2033,p86)

Lumbrineris zonata (Johnson, 1901) - continued
Hab: Intertidal (2033,p86), in mussel and barnacle beds (2394), intertidal to 35-46 fms, in mixed sediments or clean sand (3678,p777)

Lysilla pacifica Hessle - (2991,p226)
Coll: Near Seattle, 10-18m, very fine sand (2991,p226)

Lysippe labiata Malmgren - (2559,p67)
Dist: Alaska, Atlantic, Arctic to Oregon (2559,p67)
Coll: Oregon (Authors)

Magelona cerae, Hartman and Reish, 1950 - (2394,p29)
Dist: Dredged off Coos Bay in 20-40 fms in sand (2394,p29)

Magelona pitelkai Hartman, 1944 - (2559 ,p13)
Dist: B. C. to San Pedro, Calif. (2559,p13) (3677,p195)
Hab: Intertidal and shelf depths, in sandy mud (3677,p195)

Maldane glebifex Grube, 1860 - (2559,p45)
Dist: B. C. to San Diego (3677,p459)
Coll: Wash: Friday Harbor (2559,p45)

Maldane sarsi Malmgren, 1866 - (2394,p37)
Dist: Alaska to northern Calif. and both sides of the Americas in addition to cosmopolitan areas (2394,p37)
Coll: Ore: Off Coos Bay in 20-40 fms, subintertidal depths (2394,p37)
Hab: In shelf, slope, and canyon depths, in mud (3677,p461)

Maldanella robusta Moore, 1906 - (2559,p51)
Dist: Alaska to southern Calif. (2559,p51) (3677,p463)
Hab: In shelf and canyon depths, in mud (3677,p463)

Malmgrenia nigralba Berkeley, 1923 - (2558,p10)
Dist: B. C. to southern Calif. (3678,p133)
Hab: In shelf depths, in sand and mud (3678,p133)

Marphysa stylobranchiata Moore, 1909 - (2033,p83)
Dist: Oregon to central Calif. (2033,p83) (2394,p23)
Hab: Intertidal (2033,p83), to slope depths in rocky habitats (3678,p735)

ANNELIDA - POLYCHAETA

Mediomastus californiensis Hartman, 1944 - (2033,p79)
Dist: Oregon to southern Calif. (2394) (2033,p79) (3677,p387)
Hab: Intertidal and shelf depths, in mud (3677,p387)

Megalomma splendida (Moore, 1905) - (3677,p713)
Dist: Alaska to southern Calif. (3677,p713)
Hab: In mixed and rocky bottoms with sand, in shelf and slope depths (3677,p713)

Melinna cristata (Sars, 1851) - (2394,p42)
Dist: Circumboreal and cosmopolitan, recorded from Alaska to southern Calif. (2394,p42)
Coll: Ore: Station 1471, off Coos Bay, 20-40 fms (2394,p42)

Mesochaetopterus taylori Potts, 1914 - (2033,p79)
Dist: B. C. to Humbolt Bay (3677,p213)
Hab: In sand or eel grass beds (2033,p79), intertidal in sand (3677,p213)

Myriochele heeri Malmgren, 1867 - (2394,p38)
Dist: Western Canada, considered circumboreal; off Coos Bay in 20-40 fms (2394,p38)
Coll: Oregon (Authors)

Myxicola aesthetica (Claparede) - (2559,p118)
Dist: Alaska to Calif. (2559,p118)

Myxicola infundibulum (Montagu, 1808) - (2033,p98);(Renier) - (2559,p119)
Dist: Oregon to southern Calif. (2033,p98) (3677,p715)
Hab: Intertidal (2033,p98) in shelf depths and in mixed sediments (3677,p715)

Nainereis dendritica (Kinberg, 1867) - (2033,p92)
Dist: Alaska to southern Calif. (3677,p25)
Coll: Ore: Coos Bay (2394,p26); central Calif. (2033,p92)
Hab: Intertidal (2033,p92), in *Zostera*, *Phyllospadix* and 26-58 fms (2394,p26), sandy mud, common in holdfasts of grasses (3677,p25)

Nainereis laevigata (Grube) - (2559,p94)
Dist: B. C. to Calif. (2559,p95)

ANNELIDA - POLYCHAETA

Naineris nannobranchia Chamberlin, 1919 - (3677,p27)
Dist: Northern Calif. (3677,p27)
Coll: Mendocino, Calif. (3677,p27)
Hab: Intertidal (3677,p27)

Naineris uncinata Hartman, 1957 - (3677,p31)
Dist: Alaska south to southern Calif. (3677,p31)
Coll: Ore: Coos Bay in littoral sand (3677,p31)
Hab: Intertidal in its northern range and in slope depths to south; in sand and mixed sediments (3677,p31)

Neanthes brandti (Malmgren, 1866) - (2033,p88)
Dist: Alaska to southern Calif. (3678,p523)
Coll: Ore: Coos Bay (2394), Yaquina, OSU; Calif: (2033,p88)
Hab: Intertidal (2033,p88) at low and below tidal limits, in sand bars (3678,p523)

Neanthes succinea (Frey and Leuckart, 1847) - (2033,p88)
Dist: B. C. to central and southern Calif. (3678,p529); cosmopolitan (3678,p529)
Hab: The "heteronereid" stage occasionally swarms in immense numbers in sloughs bordering San Francisco Bay (2033,p88), in sandy or muddy clay banks of estuarine bays, basic food for fishes in the Salton Sea (3678,p529)

Neoamphitrite robusta (Johnson) - (2559,p85)
Dist: Alaska to Calif. (3677,p605) (2559,p85)
Coll: Wash: (3677,p605)
Hab: Littoral to 170 fms, in mud, with rocks (3677,p605)

Neoleprea spiralis (Johnson, 1901) - (2559,p84)
Dist: Alaska to southern Calif. (3677,p607) (2559,p84)
Coll: Wash: near Seattle (3677,p607)
Hab: In littoral zone, in muddy bottoms with rocks (3677,p607)

Nephtys - see also *Nephthys*

Nephtys assignis Hartman - (2398,p17)
Dist: Oregon to central Calif. to Mexico (2398,p17) (3678,p573)
Hab: In 2-5 or 84-95 fms in sand and mud (3678,p573)

ANNELIDA - POLYCHAETA

Nephtys caeca (Fabricius, 1780) - (2394,p18)
Dist: Alaska to central Calif. (3678,p575), a northern cold water species; reported south to Calif.; Arctic and boreal shores of America and Europe (2394,p18)
Hab: Mud and sand flats (2394,p18), intertidal and littoral sands, less often in mixed sediments (3678,p575)

Nephtys caecoides Hartman, 1938 - (2033,p86)
Dist: Oregon to central Calif. (2394,p19) (2033,p86)
Coll: Ore: Coos Bay (2394,p19), Yaquina Bay (2396);
Calif: central (2033,p86)
Hab: Muddy sand flats or mixed sediments;also in bays and lagoons, littoral (2033,p86) (3678,p577)

Nephtys californiensis Hartman, 1938 - (2033,p86) (2686,p32)
Dist: B. C. to Table Bluff, Calif. (2394,p19) (2033,p86) (2686,p32)
Coll: Ore: Coos Bay (2394,p19)
Hab: Clean sandy outer beaches (2033,p86), intertidal (2686,p32)

Neptys cornuta Berkeley - (2558,p50)
Dist: B. C. to Oregon
Coll: Wash: Friday Harbor, dredged in 10-12 fms (2558,p51)
Oregon (Authors)

Nephtys cornuta franciscana Clark and Jones, 1955 - (3678,p581)
Dist: B. C. to southern Calif. (3678,p581)
Hab: In sub-tidal and shelf depths, in silt and mud (3678,p581)

Nephtys ferruginea Hartman, 1940 - (2394,p19) (2398,p18)
Dist: B. C. to Peru (2394,p19) (3678,p583)
Coll: Ore: Coos Bay, in 20-58 fms (2394,p19)
Hab: In 10-230 fms, in soft mud or clays (3678,p583)

Nephtys longosetosa Oersted - (2558,p52)
Dist: B. C. to southern Calif. (2558,p52)

Nephtys punctata Hartman, 1938 - (3678,p591) (2558,p52)
Dist: Alaska, 15-483 fms, to central Calif., 68-382 fms (2558,p52) (3678,p551)
Hab: In slope depths, in muds (3678,p551)

ANNELIDA - POLYCHAETA

Nephtys rickettsi Hartman, 1938 - (3678,p593)
Dist: Alaska to southern Calif. (3678,p593)
Hab: In slope depths (3678,p593)

Nephtys rubella Michaelsen - (2558,p51)
Dist: East coast Vancouver Island, dredged in 20-250 fms (2558,p51)

Nephtys schmittii Hartman, 1938 - (3678,p595)
Dist: Alaska to central Calif. (3678,p595)
Hab: In slope depths, in mud (3678,p595)

Nereis (Nereis) callaona (Grube) - (2558,p64)
Dist: B. C. to Calif.; Japan (2558,p65)

Nereis eakini Hartman, 1936 - (2033,p88)
Dist: B. C. to Calif. (2394,p17)
Coll: Ore: Coos Bay (2394,p17); Calif: central (2033,p88) (3678,p537)
Hab: Intertidal (2033,p88), in rocky habitats (3678,p537)

Nereis mendocinana Chamberlin, 1919 - (3678,p543)
Coll: Mendocino, Calif. (3678,p543)
Hab: Intertidal (3678,p543)

Nereis (Ceratonereis) paucidentata Moore - (2558,p63)
Dist: Alaska to Calif., not taken in Canadian waters since 1903 (2558,p64)

Nereis pelagica neonigripes Hartman, 1936 - (2033,p88)
Dist: Oregon (2394) to central Calif. (2033,p88)
Hab: Intertidal (2033,p88), in rocky habitats (3678,p547)
(A subspecies of the widespread N. pelagica Linnaeus; known from NE Pacific (2394,p17))

Nereis procera Ehlers, 1868 - (2033,p88)
Dist: Alaska to Calif. (3678,p549)
Coll: Oregon (2394); Calif: central (2033,p88)
Hab: Intertidal (2033,p88), in subtidal zones in fine sandy and silty sediments (3678,p549)

ANNELIDA -POLYCHAETA

Nereis vexillosa Grube, 1851 - (2033,p88)
Dist: Alaska to California
Coll: Oregon (2394); Calif. (2033,p88)
Hab: Intertidal (2033,p88), common (2394), on piles among Mussel and barnacle clusters (3678,p551)

Nereis (Neanthes) virens (Sars) - (2558,p62)
Dist: Alaska to Calif. (2558,p63)

Nereis zonata Malmgren, 1867 - (2033,p88)
Dist: Alaska and Arctic America to central Calif. (2394) (2033,p88)
Coll: Ore: Coos Bay (2394); central Calif. (2033,p88)
Hab: Intertidal (2033,p88), pholad burrow (2394), in rocky habitats (3678,p553)

Nerine cirratulus (delle Chiage, 1828) - (2033,p102)
Includes Nerine foliosa (Audouin and Milne-Edwards - (2559,p27))
Dist: B. C. to Calif. (2394) (3677,p115)
Coll: Ore: Coos Bay and Tillamook (2394,p28); central Calif. (2033,p102)
Hab: Intertidal (2033,p102), sandy mud (3677,p115)

Nicolea zostericola (Oersted) - (2559,p87)
Dist: Alaska, North Atlantic, Arctic (2559,p88)
Hab: On eel grass (2559,p88)

Nicomache lumbricalis (Fabricius, 1780) - (2559,p54)
Dist: Alaska to southern Calif. (3677,p465)
Hab: In shelf and slope depths, to 1400 fms, circumboreal (3677,p465); all dredged in very various depths up to 1400 fms (2559,p55)

Nicomache personata Johnson, 1901 - (2559,p54)
Dist: Alaska to Calif. (3677,p467)
Coll: Wash: Alki Pt. (type loc.) (3677,p467)
Hab: In shelf and slope depths in mixed and rocky bottoms (3677,p467); Wash: littoral; Alaska: dredged in depths to 30 fms (2559,p54)

ANNELIDA - POLYCHAETA

Ninoe gemmae Moore, 1911 - (2394,p24)
Dist: B. C. to Mexico (2394,p24)
Coll: Ore: Cape Arago Stations 1471, 1497, in 20-74 fms (2394) (2341)

Nothria elegans (Johnson, 1901) - (2033,p90)
Dist: B. C. to southern Calif. (3678,p675)
Coll: Wash: Port Townsend (3678,p675); Ore: Coos Bay region (2394,p23); Calif: central (2033,p90)
Hab: Intertidal (2033,p90), shell beach (2394,p23), in littoral and sublittoral depths, in sandy mud (3678,p675)

Nothria geophiliformis (Moore, 1903) - (3678,p677)
Dist: Alaska to northern Calif. (3678,p677)
Coll: Oregon, shelf (Authors)
Hab: In 53-156 fms (3678,p677)

Nothria iridescens (Johnson, 1901) - (2033,p90)
Dist: Alaska to Mexico (3678,p681)
Coll: Oregon (2394); central Calif. (2033,p90)
Hab: Intertidal (2033,p90), in littoral to 290 fms (3678,p681)

Nothria stigmatis (Treadwell, 1922) - (2033,p90)
Dist: Washington to southern Calif. (3678,p685)
Coll: Wash: False Bay, low tide, in sand (3678,p685); Oregon (2394); central Calif. (2033,p90)
Hab: Intertidal (2033,p90), to 33 fms, in sand (3678,p685)

Notocirrus californiensis Hartman, 1944 - (2398,p21)
Dist: Puget Sound to Calif. (2398,p21)
Hab: In shelf and slope depths, in mixed sediments, chiefly black and green sand and gravel (3678,p811)

Notomastus (*Clistomastus*) *lineatus* Claparede, 1870 - (3677,p395)
Notomastus lineatus Claparede - (2559,p102)
Dist: B. C. to southern Calif. (3677,p395)
Hab: In shelf depths in red or brown, coarse to fine sand; cosmopolitan (3677,p395)

Notomastus (*Clistomastus*) *tenuis* Moore, 1909 - (2033,p79) (2559,p103)
Dist: Canada to southern Calif. (2394) (3677,p397)
Hab: Intertidal, in shelf and canyon depths, to 379m (3677,p397)

Notophyllum inbricatum Moore, 1906 - (2394,p10)
Dist: Alaska to southern Calif. (2394,p10) (3678,p289)
Hab: Along shore (2394,p10), in shelf and slope depths, in gray sand and rocky bottoms (3678,p289)

Notoproctus pacificus (Moore, 1906) - (2559,p56)
Dist: Alaska to southern Calif. (3677,p469)
Coll: Oregon
Hab: Shelf and abyssal depths, in green mud (3677,p469)

Odontosyllis parva Berkeley, 1923 - (2033,p105)
Dist: B. C. to southern Calif. (3678,p439)
Coll: Central Calif. (2033,p105)
Hab: Intertidal (2033,p105), among sponge and bryozoan masses, or creeping over mussels and algae (3678,p439)

Odontosyllis phosphorea Moore, 1909 - (2033,p105)
Dist: B. C. to southern Calif. (3678,p441)
Coll: Oregon (2394,p14); Calif: central (2033,p105)
Hab: Intertidal (2033,p105), along the shore (2394,p14)

Oncoscolex pacificus (Moore) - (2559,p59)
Dist: B. C. to Mexico (3677,p311)
Hab: In slope and canyon depths, in rocky bottoms, intertidal (3677,p311)

Onuphis conchylega Sars - (2558,p91)
Dist: Alaska to Calif. (2558,p91)

Onuphis elegans (Johnson) - (2558,p93)
Dist: B. C. to Calif. (2558,p94)

Onuphis geophiliformis (Moore) - (2558,p91)
See *Nothria geophiliformis*

Onuphis iridescens (Johnson) - (2558,p93)
See *Nothria iridescens*

Onuphis parva Moore, 1911 - (2394,p22)
Dist: Oregon to Lower Calif., Mexico (2394,p23) (3678,p701)
Coll: Ore: dredged, Coos Bay region, 20-40 fms (2394,p22)
Hab: In 26-184 fms, in mud (3678,p701)

ANNELIDA - POLYCHAETA

Ophelia limacina (Rathke, 1843) - (2033,p91)
Dist: Alaska to southern Calif. (2394,p36)
Coll: Oregon (2394,p36); central Calif. (2033,p91)
Hab: Intertidal (2033,p91), in sandy beaches, cosmopolitan in north temperate zones, intertidal in sand (3677,p333)

Ophiodromus pugettensis (Johnson, 1901) - (3678,p369)
Dist: Washington to Mexico (3678,p369)
Hab: Intertidal and shelf depths, in mixed to soft sediments (3678,p369)

Owenia fusiformis delle Chiaje, 1841 - (2394,p38)
Dist: Alaska to southern Calif. (2394,p38)
Coll: Ore: Cape Arago Stations 1464, 1472, 1493, and 1494; also at Joe Ney Slough; all are shore stations (2394,p38)

Paleanotus bellis (Johnson, 1897) - (2398,p7)
Dist: B. C. to Mexico (3678,p187)
Coll: Wash: Puget Sound (2398,p7)
Hab: Littoral, in bryozoan and sponge clusters (3678,p187)

Paradexiospira vitreus (Fabricius, 1780) - (3677,p791)
Dist: B. C. to central Calif. (3677,p791)
Hab: In canyon depth, on stones, cosmopolitan (3677,p791)

Paranaitis polynoides (Moore), 1909) - (2394,p12)
Phyllodoce (Paranaitis) polynoides (Moore) - (2558,p44)
Dist: B. C. to southern Calif. (2394,p12) (3678,p291)
Coll: Ore: Off Coos Bay in 20-40 fms (2394,p12)
Hab: In moderate depths, in coarse sand, shelly and rocky bottoms (3678,p291)

Paraonis gracilis oculata (Hartman, 1957) - (3677,p77)
Dist: Oregon, shelf depths, to Calif.
Hab: In slope, basin, and canyon depths, in silty mud (3677,p77)

Paraonis (Paradoneis) lyra Southern - (2398,p22)
Dist: Puget Sound to southern Calif.; northern Atlantic (2398,p23)

Paraspio cirrifera, Banse and Hobson - (2398,p27)
Dist: Wash: Puget Sound (2398,p27)

ANNELIDA - POLYCHAETA

Pectinaria (Amphictene) auricoma (Muller) - (2559,p105)
Dist: Alaska to B. C., Atlantic, Arctic (2559,p105)

Pectinaria (Pectinaria) belgica (Pallas) - (2559,p105)
Dist: Alaska to Calif. (2559,p106)

Pectinaria (Cistenides) brevicoma Johnson - (2559,p106)
See Cistenides brevicoma

Pectinaria californiensis Hartman, 1941 - (2033,p93)
Dist: Central Oregon to Calif. (3677,p515) (2394,p40) (2033,p93)
Coll: Ore: Coos Bay (2394,p40)
Hab: Intertidal (2033,p93), dredged 20-40 fms (2394,p40), in shelf depths, in sand (3677,p515)

Pectinophelia williamsi Hartman, 1938 - (2394,p36)
Dist: Oregon to central Calif. (2394,p36)
Coll: Ore: Coos Bay
Hab: Intertidal (2033,p91)

Peisidice aspera Johnson, 1897 - (2394,p7) (2398,p6)
Dist: Alaska to Calif. (2394,p7) (3678,p147)
Hab: Shore in 60-74 fms (2394,p7), 20-100 fms, rocky bottoms (3678,p147)

Perinereis monterea (Chamberlin, 1918) - (2033,p88)
Dist: Washington to Mexico (3678,p557)
Hab: Intertidal (2033,p88), along rocky shores (3678,p557)

Petaloproctus tenuis (Theel) - (2559,p55)
Dist: North Atlantic, Arctic, west coast Vancouver Island, dredged in about 100 fms (2559,p56)

Petaloproctus tenuis Var. borealis Arwidsson - (2559,p56)
Dist: Alaska, North Atlantic, Arctic, east coast Vancouver Island, dredged in 10-25 fms (2559,p56)

Pherusa inflata (Treadwell, 1914) - (3677,p297)
Stylarioides inflata (Treadwell) - (2033,p84)
Dist: Oregon to Mexico (3677,p297)
Coll: Ore: Coos Bay (2394,p35)
Hab: Intertidal, in rocky areas (3677,p298) (2394,p35)

Pherusa negligens (Berkeley) - (2559,p10)
As *Stylarioides*
Dist: Mitlenatch islands, dredged in about 100 fms (2559,p11)

Pherusa papillata (Johnson, 1901) - (3677,p303)
Stylarioides papillata (Johnson) - (2033,p84) (2394,p35)
Trophonia papillata Johnson
Dist: Alaska to Mexico (2394,p35) (3677,p303)
Coll: Wash: Port Orchard (3677,p303); Ore: Coos Bay (2394,p35); Calif: central (2033,p84)
Hab: Littoral, shelf and canyon depths, in rocky sediments (3677,p303)

Pherusa pulmosa (O. F. Muller)
Stylarioides pulmosa (O. F. Muller) - (2559,p9)
Dist: Alaska to Calif. (2559,p9)
Hab: Littoral (2559,p9)

Phyllochaetopterus prolifica Potts, 1914 - (2033,p79)
Dist: B. C. to southern Calif. (3677,p217)
Hab: Intertidal and shelf depths, to 100m, rarely deeper; in rocky habitats (3677,p217), usually in clusters, common under ledges in low intertidal (2033,p79)

Phyllodoce (Genetyllis) castanea (Marenzeller) - (2558,p44)
Dist: B. C. to Calif., Indian Ocean, Australia (2558,p45)

Phyllodoce (Anaitides) groenlandica Oersted - (2558,p46)
See *Anaitides groenlandica*

Phyllodoce (Anaitides) madeirensis Langerhans - (2558,p45)
See *Anaitides madeirensis*

Phyllodoce (Anaitides) mucosa Oersted - (2558,p46)
See *Anaitides mucosa*

Phyllodoce (Paranaitis) polynoides (Moore) - (2558,p44)
See *Paranaitis polynoides*

Phylo felix Kinberg, 1866 - (3677,p37)
Dist: Oregon to Mexico, to 55 fms (3677,p37)

ANNELIDA - POLYCHAETA

Pilargis berkeleyi Monro, 1933 - (2558,p57)
Dist: Washington to central Calif. (3678,p383)
Coll: Wash: Friday Harbor (3678,p383)
Hab: Intertidal to 16 fms, in sand (3678,p383)

Pionosyllis gigantea Moore, 1908 - (2033,pl05)
Dist: Alaska to southern Calif. (3678,p445)
Coll: Central Calif. (2033,pl05)
Hab: Intertidal (2033,pl05), in slope depths, in rocky and muddy sediments (3678,p445)

Pionsyllis magnifica Moore, 1906 - (3678,p447)
Dist: Alaska to central Calif. (3678,p447)
Coll: Port Townsend, Wash. (type loc.) in 16-26 fms, green mud (3678,p447)
Hab: In shallow depths, in mud, sand and shelly bottoms (3678,p447)

Pista brevibranchiata Moore, 1923 - (3677,p613)
Dist: Oregon to southern Calif. (3677,p613)
Coll: Oregon; Calif: Mendocino (3677,p613)
Hab: In intertidal depths, in slope depths, in mud (3677,p613)

Pista cristata (Muller, 1776) - (2559,p78)
Dist: Alaska to Calif. (2559,p79) (3677,p615)
Hab: In shelf, canyon and slope depths, in mud; cosmopolitan (3677,p615)

Pista elongata Moore, 1909 - (2394,p44)
Dist: B. C. to Calif. to Panama (2394,p44) (3677,p619)
Coll: Ore: Cape Arago, Squaw Island, North Bay, South Bay (2394,p44); central Calif. (2033,pl06)
Hab: In rocky intertidal (2033,pl06) (3677,p619)

Pista fasciata (Grube, 1870) - (2559,p79)
Pista fasciata (Grube, 1870) *sensu* Marenzeller - (2398,p45)
Dist: Alaska to southern Calif. (3677,p621)
Coll: Wash: Puget Sound (2398,p45)
Hab: In shelf, canyon, basin, and slope depths, in mud; cosmopolitan, in a wide range of depths (3677,p621)

ANNELIDA - POLYCHAETA

Pista fratrella Chamberlin - (2559,p80)
Dist: B. C. to California

Pista moorei Berkeley - (2559,p81)
Dist: B. C. to Calif. (3677,p625)
Hab: Slope depth, in 36m in mixed sediments of black sand, pebbles and rocks (3677,p625)

Pista pacifica Berkeley, 1942 - (2033,p106)
Dist: B. C. to Calif. (3677,p627)
Coll: Ore: Coos Bay region (2394); Calif: central (2033,p106)
Hab: Intertidal (3677,p627), in sandy mud flats (2033,p106)

Platynereis agassizi (Ehlers, 1868) - (2033,p89)
Dist: Alaska to Mexico (2394,p18)
Coll: Ore: Coos Bay (2394,p18); Calif: central (2033,p89)
Hab: This has recently been found very widely distributed in the north and south Pacific; the oldest name appears to be P. bicanaliculata (Baird) (2033,p89)

Platynereis bicanaliculata (Baird, 1863) - (2398,p17)
Dist: B. C. to southern Calif. (3678,p559)
Coll: Wash: Puget Sound (2398,p17)
Hab: Littoral, in kelps, building tubes and aggregated "nests" run along rocky coasts (3678,p559)

Platynereis dumerilii (Audouin and Milne-Edwards) var. aggassizi - (2558,p61)
Dist: Alaska to Calif. (2558,p61)

Podarke puggettensis Johnson, 1901 - (2394,p9)
Dist: B. C. to Peru (2394,p9)
Hab: Along shore, often associated with echinoderms (2394,p9)

Poeobius meseres Heath, 1930 - (2341)
Dist: NE Pacific to southern Calif. (3677,p307)
Coll: Oregon (2341)
Hab: Pelagic in 350-1300m over continental borderland (3677,p307)

Polycirrus spp. - (2033,p106)
Dist: Oregon to central Calif. (2394,p45) (2033,p106)
Hab: Intertidal (2033,p106) This species on this coast is not sufficiently well known to be distinguished (2394,p45)

Polycirrus caliendrum Claparede - (2559,p77)
Dist: B. C. and Washington (2559,p78)

Polydora armata Langerhans, 1880 - (2033,p102)
Dist: B. C. to Mexico (3677,p127)
Coll: Oregon (2394); central Calif. (2033,p102)
Hab: Intertidal coralline or calcareous growths; cosmopolitan (2033,p102) (3677,p127)

Polydora cardalia Berkeley - (2559,p21)
Dist: East coast Vancouver Island, littoral and dredged in about 30 fms (2559,p21)
Coll: Oregon

Polydora ciliata (Johnston) - (2559,p19)
Dist: Cosmopolitan (2559,p20)
Coll: East coast Vancouver Island, littoral; in walls of old shells of Thais lamellosa; a common shell and rock drilling species (2559,p20)

Polydora (Boccardia) columbiana Berkeley - (2559,p16)
See Boccardia columbiana

Polydora commensalis Andrews, 1891 - (2394,p28)
Dist: B. C. to Mexico (2394,p28)
Coll: Ore: Cape Arago, North Bay, Middle Bay (2394,p28)
Hab: Intertidal mud flats (3677,p133)

Polydora giardi (Mesnil, 1896) - (2033,p102)
Dist: Alaska to Mexico (3677,p135)
Coll: Central Calif. (2033,p102)
Hab: Intertidal (2033,p102), to 20 fms, in coralline zones, boring into calcareous growths; cosmopolitan (3677,p135)

ANNELIDA - POLYCHAETA

Polydora ligni Webster, 1879 - (2033,pl02)
P. amarincola Hartman
Dist: B. C. to Mexico (2394,p28)
Coll: Oregon (2394,p28); central Calif. (2033,pl02)
Hab: Intertidal (2033,pl02) and shelf depths (3677,pl37), water logged wood (2394,p28)

Polydora (Boccardia) polybranchia Haswell - (2559,pl6)
See Boccardia polybranchia

Polydora (Boccardia) proboscidea Hartman - (2559,pl7)
See Boccardia proboscidea

Polydora socialis (Schmarda, 1861) - (2394,p28)
Dist: Southern Alaska to Chile (2394,p28)
Coll: Ore: Coos Bay (2394,p28)
Hab: In lagoons and in depths to 68m, in mud and silt (3677,pl47)

Polydora socialis (Schmarda) subsp. plena Berkeley - (2559,p22)
Dist: Alaska to B. C. (2559,p22)
Coll: Oregon

Polydora spongicola Berkeley and Berkeley, 1950 - (3677,pl49)
Dist: B. C. to San Pedro, Calif. (3677,pl49)
Hab: In intertidal depths northward and in slope depths at southern end, associated with sponges and in mixed sediments (3677,pl48)

Polydora (Boccardia) uncata Berkeley - (2559,pl4)
See Boccardia uncata

Polydora websteri Hartman, 1943 - (3677,pl51)
Dist: Oregon south to San Francisco and Mission Bay (3677,pl51)
Hab: Intertidal and in lagoons (3677,pl51)

Potamilla neglecta (Sars) - (2559,pl16)
Dist: Alaska to southern Calif. (3677,p721)

Potamilla (Pseudopotamilla) myriops (Marenzeller) - (2398,p46)
Dist: Wash: Puget Sound (2398,p47)

ANNELIDA - POLYCHAETA

Praxillella affinis (Sars) var. pacifica Berkeley, 1929 - (2559,p49)
Dist: B.C. to southern Calif. (3677,p475)
Coll: Wash: Puget Sound (2398,p43); Oregon
Hab: Shelf and canyon depths, in mud (3677,p475)

Praxillilla gracilis (Sars, 1861) - (2559,p50)
Dist: B.C. to southern Calif. (3677,p477)
Coll: Wash: Friday Harbor (2559,p50)
Hab: Shelf, canyon and basin depths in silty mud (3677,p477)

Prionospio cirrifera Wiren, 1883 - (3677,p155)
Dist: Bering Sea to southern Calif. (3677,p155)
Hab: In shelf, canyon and basin depths, to 560m, in mud (3677,p155)

Prionospio malmgreni Claparede, 1870 - (2559,p29)
Dist: Alaska to southern Calif. (2559,p30) (3677,p159)
Hab: Very common in shallow shelf depths, in sandy mud and mixed sediments, sometimes in aggregated masses; cosmopolitan (3677,p159), in depths to 250 fms (2559,p30)

Prionospio pinnata Ehlers, 1901 - (2559,p30)
Dist: B.C. to Calif. to Chile (3677,p161)
Coll: Wash: (2559,p30) Puget Sound (2398,p29); Oregon (2559,p30)
Hab: In shelf, slope, canyon and basin depths, in silty mud (3677,p161)

Prionospio tribtanchiata (Berkeley, 1927) - (2394,p29)
Dist: Canada to southern Calif., shore to 12-17 fms (2394,p29)
Coll: Ore: Cape Arago Station 1471 (2394,p29)

Pseudopotamilla intermedia Moore, 1905 - (2033,p98)
Dist: Alaska to Calif. (3677,p727)
Coll: Central Calif. (2033,p98)
Hab: Intertidal (2033,p98), in shelf and slope depths, in rocky or mixed sediments (3677,p727)

Pseudopotamilla ocellata Moore, 1905 - (2033,p98)
Dist: Alaska to southern Calif. (2394,p46) (3677,p729)
Coll: Ore: Coos Bay region (2394,p46); Calif: central (2033,p98)
Hab: Intertidal (2033,p98), slope depths, in mixed sediments (3677,p729); the tiny 2-tentacled hydroid "Lar" occurs on the tube of this species in the Monterey area (2033,p98)

Pseudosabellides lineata Berkeley - (2559,p71)
Dist: Alaska to B. C. (2559,p72); Oregon

Pseudosabellides littoralis Berkeley - (2559,p72)
Dist: Hudson Bay, B. C. (2559,p72) to Oregon

Rhodine bitorquata Moore, 1923 - (2559,p52)
Dist: B. C. to southern Calif. (3677,p483)
Coll: Wash: Friday Harbor in 25 fms (2559,p53), Puget Sound (2398,p43); Oregon; Calif: Monterey Bay in 75-766 fms (type loc.) (2559,p53) (3677,p483)
Hab: Shelf, slope, and canyon depths, in soft sediments (3677,p483)

Rhynchonereella angelini Kinberg, 1866 - (2341) (2553,p23)
Dist: B. C. to Oregon (2341) (2553,p23)
Remarks: Surface, rare, spring (2553,p23)

Rhynchospio arenincola Hartman, 1936 - (2033,p103) (2394,p203)
Dist: Puget Sound, San Juan Archipelago, Wash. (2394,p197) to San Mateo County and San Pedro Channel (3677,p171)
Hab: Intertidal (2033,p103) to shelf depths, in sand and muddy sand (3677,p171)

Sabella crassicornis Sars, 1851 - (2033,p98)
Dist: Alaska to southern Calif. (3677,p733)
Coll: Calif: central (2033,p98)
Hab: Intertidal (2033,p98), in shelf and slope depths, in mixed sediments (3677,p733)

Sabella media (Bush, 1904) - (2033,p98)
Dist: Alaska to southern Calif. (2394,p47)
Coll: Oregon (2394,p47); Calif: central (2033,p98)
Hab: Intertidal (2033,p98)

Sabellaria cementarium Moore, 1906 - (2033,p97)
Dist: Alaska to lower Calif. (2394,p41) (3677,p505)
Coll: Wash: Port Townsend (type loc.) 16-31 fms (3677,p505); Oregon (2394,p41); Calif: central (2033,p97)
Hab: Intertidal (2033,p97), littoral and shelf depths, on rocky bottoms (3677,p505)

ANNELIDA - POLYCHAETA

Salmacina tribranchiata (Moore, 1923) - (2033,p100)
= *Salmacina dysteri* (Huxley) var. *tribranchiata* (Moore, 1923) - (2559,p131)
Dist: B. C. to southern Calif. (3677,p771)
Coll: Calif: central (2033,p100), off Santa Rosa Island, (type loc.), 38-45 fms (3677,p771)
Hab: Intertidal (2033,p100) and shelf depths (3677,p771); sometimes considered a variety of *S. dysteri* Huxley) (2033,p100)

Scalibregma inflatum Rathke, 1843 - (2559,p58)
Dist: Alaska to southern Calif. (2559,p58) (3677,p313)
Hab: In shelf, slope basin, and canyon depths, in coarse sand and shelly sediments (3677,p313)

Scionella japonica Moore - (2559,p86)
Dist: B. C., Washington, Japan (2559,p87)
Coll: Wash: Puget Sound (2398,p46), Friday Harbor (2559,p87)

Schistocomus hiltoni Chamberlin, 1919 - (2394,p42)
Dist: Oregon (Authors) to Calif. (2394,p42)
Coll: Ore: Cape Arago Stations 1464, 1476, 1487, South Slough, Institute Beach, North Bay, and South Bay (2394,p42)

Schizobranchia insignis Bush, 1904 - (2033,p98)
Dist: Alaska to central Calif. (3677,p735)
Coll: Oregon (2394,p46); central Calif. (2033,p98)
Hab: Intertidal (2033,p98), rocky habitats (3677,p735)

Scionella japonica Moore, 1903 - (3677,p635)
Dist: B. C. to southern Calif. (3677,p635)
Hab: In shelf, slope and canyon depths (3677,p635)

Scoloplos acmeceps Chamberlin, 1919 - (2033,p92)
Dist: Alaska to Mexico (3677,p43)
Coll: Oregon (2394,p26); Calif: central (2033,p92), Balboa, intertidal (type loc.) (3677,p43)
Hab: Intertidal (2033,p92) (2394,p26), littoral, in holdfasts of algae and grasses (3677,p43)

ANNELIDA - POLYCHAETA

Scoloplos armiger (O. F. Muller, 1776) - (2033,p92)
Dist: Oregon (Authors) to southern Calif. (3677,p47) (2033,p92)
Hab: Intertidal (2033,p92), in littoral depths, in sand and mixed sediments (3677,p47)

Serpula vermicularis Linnaeus, 1767 - (2394,p47); Linne (2559,p125)
Dist: Alaska to southern Calif. (2394,p47) (3677,p773)
Coll: Ore: Cape Arago, Fossil Point, Squaw Island, North Bay, South Bay, Coos Head, attached to stationary rocks (2394,p47); central Calif. (2033,p100)
Hab: Intertidal (2033,p100), subtidal depths, on hard surfaces (3677,p773)

Sigambra tentaculata (Treadwell) - (2398,p14)
Dist: Puget Sound, Washington to southern Calif. (2398,p14-15)

Sige montereyensis Hartman, 1936 - (3678,p301)
Dist: Central Calif. (3678,p301)
Hab: In littoral depths (3678,p301)

Sphaerodoridium biserialis (Berkeley and Berkeley, 1944) - (3678,p601)
Dist: B. C. to southern Calif. (3678,p601)
Hab: In shelf and slope depths (3678,p601)

Sphaerodoridium minutum (Webster and Benedict, 1887) - (3678,p603)
Dist: B. C. to southern Calif. (3678,p603)
Hab: In shelf depths, mud (3678,p603)

Sphaerodoridium sphaerulifer (Moore) - (2398,p18)
Dist: Puget Sound, Washington to Monterey Bay (type loc.) Calif. on deep fish line (2398,p18) (3678,p605)

Sphaerodorum papillifer Moore, 1909 - (3678,p609)
Dist: B. C. to southern Calif. (3678,p609)
Hab: In slope depths, in rocky habitats (3678,p609)

Sphaerosyllis hystrix Claparede, 1863 - (2558,p80)
Dist: B. C. to southern Calif. (3678,p455)
Hab: Intertidal, in algal and shelly bottoms (3678,p455)

ANNELIDA - POLYCHAETA

Spaerosyllis pirifera Claparede, 1868 - (2558,p80)
Dist: B. C. to southern Calif. (3678,p457)
Hab: Littoral depths (3678,p457)

Spio filicornis (O. F. Muller, 1776) - (2033,p103)
Coll: Central Calif. (2033,p103), San Mateo County (3677,p173)
Hab: Intertidal (2033,p103), in sand overgrown with vegetation, cosmopolitan (3677,p173)

Spio filicornis (O. F. Muller) var. *pacifica* Berkeley - (2559,p25)
Dist: East coast Vancouver Island, littoral, common (2559,p25) to Oregon

Spiophanes bombyx (Claparede, 1870)- (2559,p22)
Dist: B. C. to southern Calif. (3677,p181)
Hab: In shelf, slope and canyon depths, in silty mud, cosmopolitan (3677,p181)

Spiophanes cirrata Sars - (2559,p24)
Dist: West coast Vancouver Island, littoral and dredged, fairly common (2559,p25); Oregon (Authors)

Spirobranchus spinosus Moore, 1923 - (2033,p100)
Dist: Central Calif. (2033,p100)
Hab: Intertidal (2033,p100)

Spirorbis borealis Daudin, 1800 - (3677,p793)
Dist: B. C. to southern Calif. (3677,p793)
Hab: Intertidal on kelps and stones or shells, cosmopolitan (3677,p793)

Spirorbis (*Laeospira*) *granulatus* (Linne) - (2559,p137)
Dist: Alaska to Mexico (2559,p137)

Spirorbis (*Laeospira*) *langerhansi* Caullery and Mesnil - (2559,p137)
Dist: B. C. to Panama (2559,p138)
Hab: On *Serpula vermicularis* tubes (Pixell) (2559,p138)

Spirorbis (*Laeospira*) *medius* Pixell - (2559,p135)
Dist: B. C.; Ireland (2559,p136)

ANNELIDA - POLYCHAETA

Spirorbis (Laeospira) morchi Levinsen - (2559,pl38)
Spirorbis moerchi Levinsen, 1883 - (3677,p797)
Dist: B. C. to Mexico (2559,pl38) (3677,p797)
Hab: In littoral zones, attached to shells in rocky habitats (3677,p797)

Spirorbis (Dexiospira) pusilloides Bush - (2559,pl34)
Dist: B. C. to Mexico (2559,pl34)

Spirorbis (Dexiospira) spirillum (Linne) - (2559,pl33)
Dist: Alaska to Mexico (2559,pl33)

Spirorbis (Laeospira) validus Verrill - (2559,pl36)
Dist: Alaska to B. C. (2559,pl37)

Spirorbis (Laeospira) variabilis Bush (2559,pl36)
Dist: Alaska to Mexico (2559,pl36)

Stauronereis japonica (Annehkova) - (2991,p226)
Staurocephalus japonica Ushakov, 1955
Coll: Wash: Southern Puget Sound (10-21m, medium sand) (2291,p226)

Sternaspis fossor Stimpson, 1854 - (2559,p59)
Probably *S. scutata*
Dist: Alaska to southern Calif. (3677,p351) (2559,p60)
Hab: In shelf and slope depths, in mixed sediments (3677,p351)

Sternaspis scutata (Ranzani, 1817) - (2394,p38)
See also *S. fossor*
Dist: Alaska to Calif. in addition to cosmopolitan areas (2394,p38)
Coll: Ore: Many specimens were dredged at Station 1471 off Coos Bay in 20-40 fms (2394,p38)
Hab: From an extensive bathymetric range from subintertidal to abyssal zones (2394,p38)

Sthenelais articulata Kinberg - (2558,p23)
Dist: B. C. to Calif. (2558,p23)

ANNELIDA - POLYCHAETA

Sthenelais fusca Johnson, 1897 - (2394,p8)
Dist: Washington to Panama (2394,p8) (3678,p163)
Coll: Ore: north of Winchester Bay in 26-48 fms, and Institute Beach, Charleston; occurs typically in root masses of eel grass (2394,p8)
Hab: In shelf depths, among rhizones of Phyllospadix (3678,p163)

Sthenelais verruculosa Johnson, 1897 - (2394,p8)
Dist: B. C. to Mexico (2394,p8) (3678,p167)
Coll: Ore: off Coos Bay in sand, 20-40 fms (2394,p8)
Hab: Subintertidal to 30 fms, in sandy bottoms (3678,p167)

Streblosoma bairdi (Malmgren) - (2559,p82)
Dist: Friday Harbor, Washington to Calif. (2559,p82)

Streptosyllis latipalpa Banse - (2992,p151)
Coll: Wash: intertidal sand near Seattle (2992,p151)

Stylarioides arenosa (Webster) - (2559,p10)
Dist: B. C. to Channel Islands, Calif. (2559,p10)

Stylarioides inflata (Treadwell, 1914) (Hartman, 1952) -(2033,p84)
See Pherusa inflata

Stylarioides negligens Berkeley - (2559,p10)
See Pherusa negligens

Stylarioides papillata (Johnson, 1901) - (2033,p84)
See Pherusa papillata

Stylarioides plumosa (O. F. Muller) - (2559,p9)
See Pherusa plumosa

Syllis armillaris (Muller) - (2558,p72)
Dist: Alaska to Calif. (2558,p72)

Syllis elongata (Johnson, 1901) - (2033,p105)
Dist: Alaska to Mexico (2394,p15) (3678,p461)
Coll: Oregon: Coos Bay (2394,p15); Calif: central (2033,p105)
Hab: Intertidal (2033,p105), in hydroids (2394,p15), in stoney and shelly bottoms (3678,p461)

ANNELIDA - POLYCHAETA

Syllis fasciata Malmgren - (2558,p74)
Dist: B.C. to Calif. (2558,p75)

Syllis harti Berkeley - (2558,p77)
Dist: B.C. (2558,p77)

Syllis (Typosyllis) harti Berkeley and Berkeley - (2398,p17)
Coll: Puget Sound, Washington (2398,p17)

Syllis hyalina Grube - (2558,p74)
Dist: B.C. to Calif. (2558,p74)
Hab: In sponge *Ectyodoryx parasitica* growing on shell of *Pecten hindsi* dredged in 30-50 fms (2558,p74)

Syllis pulchra Berkeley - (2558,p73)
Dist: Alaska to Calif. (2558,p73)
Hab: Littoral and dredged in 15-25 fms (2558,p73)

Syllis sclerolaema Ehlers - (2558,p73)
Dist: B.C. and Puget Sound (2558,p73)
Coll: Wash: Friday Harbor (2558,p73)
Hab: Dredged in 8-50 fms, both free-living and in sponge *Ectyodoryx parasitica* growing on shell of *Pecten hindsi*, littoral (2558,p73)

Telepsavus costarum Claparede, 1870 - (2559,p63)
Dist: B.C. to southern Calif. (3677,p219)
Coll: west coast of Vancouver Island (2559,p63)
Hab: In sand-beds, at or near lowest tide mark, often associated with *Mesochaetopterus taylori*; dredged in 20-40 fms (2559,p63); in shelf, slope, and canyon depths, in sandy silts; cosmopolitan (3677,p219)

Terebellides stroemi Sars, 1835 - (2394,p44)
Dist: Alaska to western Mexico, cosmopolitan (2394,p44)
Coll: Ore: off Coos Bay in 20-40 fms (2394,p44)

Thalenessa spinosa (Hartman, 1939) - (3678,p177)
Dist: Central and southern Calif. (3678,p177)
Hab: In shallow depths, in silty sediments (3678,p177)

Tharyx multifilis Moore, 1909 - (2559,p34)
Dist: B.C. to Calif. (2559,p35) (3677,p263)
Coll: Wash: Puget Sound (2398,p37); Oregon

Tharyx multifilis Moore var. *parvus* Berkeley - (2559,p35)
Dist: East coast Vancouver Island, littoral (2559,p35); Oregon

ANNELIDA - POLYCHAETA

Tharyx parvus Berkeley, 1929 - (2033,p82)
Dist: B. C. to southern Calif. (3677,p265)
Hab: Estuarine and intertidal, in mud and silt flats (3677,p265)

Thelepus crispus Johnson, 1901 - (2033,p106)
Dist: Alaska to southern Calif. (3677,p645)
Coll: Ore: Coos Bay region and others (2394,p44); Calif: central (2033,p106)
Hab: Intertidal (2033,p106), in mixed bottoms (3677,p645)

Thelepus hamatus Moore, 1905 - (2559,p82)
Dist: Alaska to Calif. (2559,p83) (3677,p647)
Hab: In shelf and slope depths, in sand (3677,p647)

Thelepus setosus (Quatrefages, 1865) - (2559,p83)
Dist: B. C. to southern Calif. (3677,p649)
Hab: In shelf, slope and basin depths, in mixed sediments; cosmopolitan, in shelf and slope depths (3677,p649)

Thoracophelia mucronata (Treadwell, 1914) - (2033,p91)
See *Euzonus*

Tomopteris cavallii Rosa - (2341)
Dist: Oregon (2341)

Tomopteris (Johnstonella) pacifica Izuka, 1914 - (2341)
Dist: B. C. to Monterey Bay, Calif. (3678,p353)
Coll: Oregon (2341)
Hab: Pelagic (3678,p353)

Tomopteris nisseni Rosa - (2341)
Dist: Oregon (2341)

Tomopteris septentrionalis Quatrefuges, 1865 - (2553,p23) (2394,p12)
Dist: B. C. to southern Calif. (2553,p23) (3678,p355)
Coll: Ore: Coos Bay (2394,p12)
Hab: Surface to 1000m, cosmopolitan, in wide range of depths (3678,p355), mid-depth and deep, abundant (2553,p23), occurs in plankton of northern seas (2394,p12)

ANNELIDA - POLYCHAETA

Tomopteris renata Berkeley and Berkeley, 1948 - (2553,p23) (2558,p26)
Dist: B. C. (2553,p23)
Hab: In plankton (2558,p26), deep, rare (2553,p23)

Travisia brevis Moore, 1923 - (2559,p90) (2394,p37)
Dist: Alaska to southern Calif. (2394,p37) (3677,p343)
Coll: Wash: Puget Sound (2398,p41); Ore: off Coos Bay in 20-40 fms (2394,p37); Calif: off Pt. Loma (type loc.) in 62-183 fms, gray sand (3677,p343)
Hab: In 10-183 fms, in shelf and slope depths, in gray sand and green mud (3677,p343)

Travisia gigas Hartman, 1938 - (2033,p91)
Dist: Oregon (Authors) to San Diego Bay (3677,p347)
Hab: Intertidal (2033,p91), sandy flats (3677,p347)

Travisia pupa Moore - (2559,p89)
Dist: Alaska to Calif. (2559,p90)

Trichobranchus glacialis Malmgren - (2559,p76)
Dist: Cosmopolitan (2559,p76)
Coll: Oregon (Authors)

Trypanosyllis adamanteus Treadwell, 1914 - (2033,p105)
Dist: Oregon to Mexico (2394,p14)
Coll: Ore: Coos Bay (2394,p14); Calif: central (2033,p105)
Hab: Intertidal (2033,p105), between mussels and barnacle clumps (2394,p14)

Trypanosyllis gemmipara Johnson, 1901 - (2033,p105)
Dist: Alaska to Mexico (2394,p14)
Coll: Wash: Port Townsend (type loc.) (3678,p467)
Ore: Coos Bay region (2394,p14); Calif: central (2033,p105)
Hab: Intertidal (2033,p105), associated with bryzoan, sponge and ascidian masses (3678,p467)

Trypanosyllis ingens Johnson, 1902 - (2559,p139)
Dist: B. C. to Pacific Grove, Calif. (3678,p469)
Hab: Between tide marks, also in large kelp, *Nereocystis pyrifera* (3678,p469)

ANNELIDA - Polychaeta

Typhloscolex mulleri Busch - (2558,p30)
Dist: B. C.: west coast Vancouver Island (2558,p30)
Hab: In plankton (2558,p30), also deep (2553,p24)

Typosyllis armillaris (O. F. Muller, 1776) - (2033,p105)
Dist: B. C. to southern Calif. (3678,p481)
Hab: Intertidal (2033,p105), cosmopolitan, in littoral zones (3678,p481)

Typosyllis fasciata (Malmgren, 1867) - (3778,p485)
Dist: B. C. to southern Calif. (3678,p485)
Hab: In intertidal zones, associated with Mytilus colony, or in pile fauna (3678,p485)

Typosyllis hyalina (Grube, 1863) - (2033,p105)
Dist: B. C. to Calif., cosmopolitan (3678,p487)
Hab: Intertidal (2033,p105), in intertidal zones, with algal, sponge and mollusk clumps (3678,p487)

Typosyllis pulchra (Berkeley, 1938) - (2033,p105)
Dist: Alaska to Calif. (3678,p493) (2394,p14)
Coll: Ore: Fossil Pt., Yaquina Head (2394,p14); Calif: central (2033,p105)
Hab: Intertidal (2033,p105), in 15-25 fms (3678,p493)

Vermiliopsis multiannulata (Moore, 1923) - (3677,p781)
Dist: Oregon to southern Calif. (3677,p781)
Hab: In shelf, slope and canyon depths, on rocky surfaces (3677,p781)

PHYLUM ARTHROPODA

Subphylum: Chelicerata
Class: PYCNOGONIDA

Achelia chelata (Hilton, 1939) - (2033,p210)
Ammothea euchelata Hedgpeth, 1940
Coll: Central Calif. coast (2033,p210) (2199) (3125,p19)
Hab: Intertidal (2033,p210); infesting Mytilus californianus (2006,p478) (3126,p16)

ARTHROPODA - Pycnogonida

Achelia echinata Hodge, 1864 - (2033,p210)
Coll: Calif: central coast, San Francisco (2033,p208)
Hab: Intertidal (2033,p210)

Achelia gracilipes (Cole, 1904 - (2033,p210)
Dist: Alaska to California (2033,p209) (2201,p106)
Coll: Calif: Bolinas (3125,p20)
Hab: Intertidal (2033,p210)

Achelia nudiuscula (Hall, 1913) - (2033,p210)
Coll: Central Calif. coast (2033,p210) (2206), San Francisco (3125,p20)
Hab: Intertidal (2033,p210)

Achelia simplissima (Hilton, 1939) - (2033,p210)
Coll: Calif: central coast (2033,p210), Dillon Beach (2201,p108)
Hab: Intertidal (2033,p210)

Achelia spinoseta (Hilton, 1939) - (2033,p210)
Coll: Calif: central coast (2033,p210), Moss Beach, Dillon Beach (2201,p106)
Hab: Intertidal (2033,p210)

Ammothea euchelata Hedgpeth 1940
See *Achelia chelata*

Ammothella bi-unguiculata (Dohrn, 1881) - (2033,p210)
Coll: Calif: central coast (2033,p210), San Pedro Point, Lower Calif. (2199,p255) (2006,p479), Laguna Beach (2006,p157)
Hab: Intertidal (2033,p210)

Ammothella menziesi Hedgpeth, 1951 - (2201,p108)
Coll: Calif: central coast (2033,p210), Dillon Beach (2201,p108)
Hab: Intertidal (2033,p210)

Ammothella setosa Hilton, 1942 - (2033,p210)
Coll: Calif: central coast (2033,p210), Bolinas (3125,p20)
Hab: Intertidal (2033,p210)

ARTHROPODA - Pycnogonida

Ammothella tuberculata Cole, 1904 - (2033,p210)
Coll: Calif: central coast (2033,p210), Dillon Beach (2201,p108), northern Calif. to Laguna Beach (2006,p153), Bolinas (3125,p20)
Hab: Intertidal (2033,p210)

Anoplodactylus erectus Cole, 1904 - (2033,p210)
Coll: Calif: central coast (2033,p210), Balboa, Pacific Grove (2006,p367)
Hab: Intertidal (2033,p210)

Callipallene californiensis (Hall, 1913) - (2033,p210)
Coll: Calif: Laguna Beach (2033,p204)
Hab: Intertidal (2033,p210)

Decachela discata Hilton, 1939 - (2033,p210)
Coll: Calif: central coast (2033,p210), Pacific Grove (2199,p254)
Hab: Intertidal (2033,p210)

Eurycyde spinosa Hilton, 1916 - (2033,p210)
Coll: Calif: central coast (2033,p210), Santa Cruz Islands, Laguna Beach (2199,p254)
Hab: Intertidal (2033,p210)

Halosoma compactum (Hilton, 1939) - (2033,p210)
Coll: Calif: central coast, Pacific Grove (2033,p205)
Hab: Intertidal (2033,p210)

Halosoma viridintestinale Cole, 1904 - (2033,p210)
Coll: Calif: central coast (2033,p210), Dillon Beach (2201, p106) (3125,p19), Monterey to Tomales Bay (2006, p350)
Hab: Intertidal (2033,p210), on eel grass (3125,p19), on *Obelia* on which it probably feeds (2006,p350), on Girdle species of *Mopalia muscosa* (3125,p19)

Lecythorhynchus marginatus Cole, 1904 - (2033,p210)
Coll: Calif: central coast (2033,p210), Marin Co. to Laguna Beach (2199,p255), Dillon Beach (2201,p111), south to Cedros Island, Vladvastok (2006,p103), Bolinas (3125,p20)

ARTHROPODA - Pycnogonida

Nymphon grossipes (O. Fabr)
Dist: Circumpolar, Puget Sound, Bering Sea (2199,p255)

Nymphon heterodenticulatum Hedgpeth
Coll: Calif. off Santa Catalina Island (2199,p255)

Nymphon pixellae Scott
Coll: Puget Sound; Departure Bay, B. C.; off southern Calif. (2199,p255)

Nymphopsis spinosissima (Hall, 1912) - (2033,p210)
Coll: Calif: central coast (2033,p210), Dillon Beach (2201,p110)
Hab: Intertidal (2033,p210)

Phoxichilidium femoratum (Rathke, 1799) - (2033,p210)
Dist: Calif., both sides of the Atlantic, Alaska, boreal (2033)
Coll: Calif: central coast (2033,p210), Marin Co. (3125,p19)
Hab: Intertidal (2033,p210)

Phoxichilidium quadridentatum Hilton, 1942 - (2033,p210)
Dist: Dutch Harbor, Alaska to Laguna Beach, Calif. (2006,p104)
Coll: Central Calif. coast (2033,p210)
Hab: On buoys not on shore (2033,p204)

Phoxichilus compactus Hilton
Coll: Central Calif. coast (2199,p254)

Pycnogonum rickettsi Schmitt, 1934 - (2033,p210)
Coll: Wash: Friday Harbor (2006,p352); Calif: central coast (2033,p210), Tomales Point, Monterey Bay, Santa Cruz Island (2199,p254), Dillon Beach, Galapagos Island (2201,p116), Bolinas (3125,p21)

Pycnogonum stearnsi Ives, 1892 - (2033,p210)
Dist: Alaska to San Diego (2199,p254)
Coll: Ore: Cape Arago (2006,p352); Calif: central coast (2033,p210), Bolinas (3125,p21), Dillon Beach (2201,p116), Humboldt Co. (2196,p251), not found at San Diego (2006,p352)
Feeding: Feeds on anemones (2974,p203) (2006,p352) (3125,p21)

ARTHROPODA - ARACHNIDA

Rhynchothorax philopsammum Hedgpeth, 1951 - (2033,p210)
Coll: Calif: central coast (2033,p210), Tomales Bluff, Dillon Beach (2201,p111)
Hab: Intertidal (2033,p210)

Tanystylum anthomasti Hedgpeth
Dist: Japan, Alaska to Oregon (2006,p202)
Coll: Ore: Cape Arago (2006,p202)

Tanystylum californicum Hilton, 1939 - (2033,p210)
Coll: Calif: central coast (2033,p210), Marin Co., southern Calif. (2199,p255), Dillon Beach (2201,p115), on *Azlaaphenia* along Calif. coast (2006,p104), Bolinas (3125,p20)

Tanystylum duospinum Hilton, 1939 - (2033,p210)
Coll: central Calif. coast (2033,p210) (2199,p255)
Hab: Intertidal (2033,p210)

Tanystylum intermedium Cole, 1904 - (2033,p210)
Coll: Calif: central coast (2033,p210), Carmel to San Diego (2199,p255)
Hab: Intertidal (2033,p210)

Tantystylum nudum Hilton
Coll: Central Calif. coast (2199,p255)

Tanystylum occidentalis (Cole, 1904) - (2033,p210)
Dist: Washington to Calif. (2033,p209)
Coll: Calif: Pacific Grove, southern Calif. (2199,p255)
Hab: Intertidal (2033,p210)

Class: ARACHNIDA

Halobisium occidentale Beier - (2033,p197)
Dist: Alaska to San Francisco (2033,p197)
Hab: Under *Salicornia* and logs in marshes

ARTHROPODA - CRUSTACEA - Branchiopoda

Subphylum: MANDIBULATA
Class: CRUSTACEA
Subclass: Branchiopoda (Cladocera)

Evadne normanni Loven, 1836 - (2553,p27)
Dist: Alaska to southern Calif., cosmopolitan (2037,p341)
Coll: B. C.: (2553,p27), Vancouver Island (2037,p341) (2043,p347, 251); Calif: southern end Monterey Bay in sfc. hauls (2037,p341), occurred throughout year in Monterey but highest conc. was in early May (2037)
Temp: (lit. review (2037,p342)), Cleve 9.17°C avg. of 8 obs, 12.8 max, 8 min Rammner 6-18°C; Baker (2037) Monterey 10-16°C, 12-14°C most usual; southern Calif. 15.5-18.5°C
Salinity: (lit. review 2037), Cleve 34.49‰ avg. of 7 obs, max 35.47‰, min 31.83‰ Rammner 2-35‰

Evadne tergestina Claus, 1877 - (2553,p27)
Dist: B. C. (2553,p27)

Podon leuckartii Sars, 1862 - (2553,p27)
Dist: B. C. (2553,p27)

Podon polyphemoides (Leuckhart, 1859) - (2553,p27)
Dist: B. C. to Calif., cosmopolitan (2553,p27) (2043,p247,251)
Coll: B. C.: Vancouver Island (2043,p247,251); Calif: Monterey Bay, occurs throughout entire year, highest frequency in winter (2037)
Hab: Planktonic nearshore and oceanic
Temp: Lit. review (2037,p328); Aurivillius, 10.2-19.8°C (2037); Rammner, 2.46-17.92°C (2037); Baker, Monterey material 10-16°C but most from 12-14°C (2037); optimal thermal range established by Rammer, 10-15°C (2037)
Salinity: Lit. review (2037,p328); Aurivillius, 21‰; Rammner can stand extremes 1.05-35.1‰; Baker, Monterey Bay 32.5-34.0‰ (2037,p329)

ARTHROPODA - CRUSTACEA - Ostracoda

Subclass: Ostracoda

The listings of Ostracoda presented here are incomplete. In a forthcoming publication on Ostracoda from Oliver and Boyd, Ltd. edited by J. W. Neale, there will be an article on Pacific Coast Ostracoda including the material collected by Oregon State University and identified by Dr. Frederick M. Swain. It was hoped that this information would be published before we went to press.

Conchoecia alata minor McHardy, 1964 - (2553,p31)
    Dist: B. C. (2553,p31)
    Hab: Mid-depth and deep, common (2551,p31)

Conchoecia elegans Sars, 1865 - (2553,p31)
    Dist: B. C. (2553,p31)
    Hab: Mid-depth and deep, abundant (2553,p31)

Conchoecia spinorostris Claus, 1891 - (2553,p31)
    Dist: B. C. (2553,p31)

Corycaeus anglicus Lubbock, 1857 - (2553,p46)
    Dist: B. C. (2553,p46)
    Hab: Mid-depth, common (2553,p46)

Gigantocypris agassizii (Muller) - (2341)
    Coll: Oregon (2341)

Subclass: Copepoda

Acartia clausi Giesbrecht - (2548,p7)
    Coll: Wash: 47°23'N, 124°30'W; 48°23'N, 124°52'W; 47°11'N, 124°19'W; 46°27'N, 124°12'W; 48°16'N, 123°41'W (2684); Ore: 45°33'N, 124°02'W; 44°36'N, 124°08'W; 45°52'N, 124°00'W; 46°04'N, 124°30'W (2684)
    Hab: Pelagic in plankton

ARTHROPODA - CRUSTACEA - Copepoda

Acartia danae Giesbrecht - (2341)

Coll: Wash: 46°28'N, 124°26'W (2684); Ore: 45°52'N, 124°00'W; 45°48'N, 124°19'W; 44°40'N, 124°26'W; 46°04'N, 124°18'W; 45°57'N, 124°11'W (2684)

Misc: This species was found to be an indicator of seasonal changes in surface currents off the coast of Oregon. *A. danae* occurs both inshore and offshore in winter indicates northward flow with inshore component and *Centropages mcmurrichi* found inshore in early summer indicates southerly flow with offshore component. Spring and autumn both species occur together inshore indicates a transitional state (3670)

Acartia longiremis (Lilljeborg) - (2341)

Coll: Wash:
46°27'N, 124°12'W
48°16'N, 123°41'W
47°23'N, 124°30'W
48°23'N, 124°52'W
46°08'N, 124°04'W
47°11'N, 124°19'W
46°57'N, 124°18'W
46°25'N, 124°33'W
47°47'N, 124°53'W
46°39'N, 124°16'W
46°28'N, 124°26'W
(2684)

Ore:
45°52'N, 124°00'W
45°34'N, 124°02'W
46°04'N, 124°18'W
46°17'N, 124°21'W
44°36'N, 124°08'W
45°13'N, 124°16'W
45°48'N, 124°19'W
43°51'N, 124°18'W
42°58'N, 124°37'W
45°57'N, 124°11'W
45°33'N, 124°02'W
44°07'N, 124°22'W
44°07'N, 124°22'W
44°24'N, 124°18'W
44°40'N, 124°26'W
45°43'N, 124°25'W
44°20'N, 124°20'W
(2684)

Acartia negligens - (2684)

Coll: Ore: 45°48'N, 124°19'W; 43°51'N, 124°13'W (2684)

Acartia tonsa - (2684)

Coll: Wash: 46°15'N, 124°11'W (2684); Ore: 46°04'N, 124°18'W; 45°57'N, 124°11'W (2684)

Aegisthus mucronatus Giesbrecht - (2548, p7)

Coll: Oregon (2548, p7)

Aetideopsis pacifica Esterly - (2341)

Coll: Oregon (2341)

ARTHROPODA - CRUSTACEA - Copepoda

Aetideus armatus (Boeck) - (2341)
Coll: Wash: 46°25'N, 124°33'W (2684); Ore: 45°13'N, 124°16'W; 45°331N, 124°02'W (2684)

Aetideus pacificus Brodsky - (2341)
Coll: Oregon (2341)

Amallothrix valida (Farran) - (2341)
Coll: Oregon (2341)

Amallothrix vorax (Esterly) - (2341)
Coll: Oregon (2341)

Arietellus plumifer G. O. Sars - (2341)
Coll: Oregon (2341)

Bathycalanus bradyii (Wolfenden) - (2341)
Coll: Oregon (2341)

Bradyodius sp. - (2684)
Coll: Ore: 44°20'N, 124°20'W (2684)

Caetanus secundus Esterly - (2341)
Coll: Oregon (2341)

Calanus spp. - (2033,pl26)
Coll: Central Calif. coast (2033,pl26)
Hab: Intertidal (2033,pl26)

Calanus cristatus Krøyer - (2341)
Coll: Washington (2341) and Oregon, 45°13'N, 124°16'W (2684)

Calanus finmarchicus (Gunner) 1765 - (2341)
Dist: Cosmopolitan
Hab: Intertidal (2033,pl26)
Temp: 0-10°C range; appears copepods do not acclimate to temperature changes outside their seasonal temp. range. They can however compensate for temp. change in vicinity of water where they were collected. plus O_2 information (2695)

ARTHROPODA - CRUSTACEA - Copepoda

Calanus finmarchicus (Gunner) - continued

Oxygen: O_2 consumption in relation to environmental conditions (2873)

General Biol: Reviewed in detail by Marshall and Orr (3420), includes chapters on systematics, anatomy, reproduction, development, life cycle, size, feeding, respiration, vertical migration, parasites, and ecology.

Calanus pacificus Brodsky - (2341)

Coll: Wash: 46°25'N, 124°33'W
46°27'N, 124°12'W
46°28'N, 124°26'W
47°47'N, 124°53'W
46°17'N, 124°21'W
46°15'N, 124°11'W
Ore: 45°52'N, 124°00'W
43°51'N, 124°13'W
46°08'N, 124°04'W
44°24'N, 124°18'W
44°07'N, 124°22'W
44°20'N, 124°20'W
46°04'N, 124°18'W
45°57'N, 124°11'W
48°16'N, 123°41'W
47°11'N, 124°19'W
48°23'N, 124°52'W
47°23'N, 124°30'W
48°27'N, 124°45'W
46°47'N, 124°18'W (2684)
42°58'N, 124°37'W
45°43'N, 124°25'W
45°18'N, 124°16'W
44°36'N, 124°08'W
45°33'N, 124°02'W
45°48'N, 124°19'W
45°34'N, 124°02'W
(2684)

Calanus plumchrus Marukawa - (2341)

Coll: Wash: 46°15'N, 124°11'W
48°23'N, 124°52'W
46°25'N, 124°33'W
Ore: 42°58'N, 124°37'W
45°34'N, 124°02'W
46°17'N, 124°21'W
44°07'N, 124°22'W
46°08'N, 124°04'W
47°47'N, 124°53'W
48°16'N, 123°41'W
46°39'N, 124°16'W (2684)
45°57'N, 124°11'W
46°04'N, 124°18'W
46°27'N, 124°12'W
44°24'N, 124°18'W
(2684)

Calanus tenuicornis Dana - (2341)

Coll: Wash: 48°16'N, 123°44'W
48°23'N, 124°52'W
48°27'N, 124°45'W
Ore: 45°52'N, 124°00'W
45°43'N, 124°25'W
45°13'N, 124°16'W
45°48'N, 124°19'W
46°04'N, 124°18'W
45°57'N, 124°11'W
46°28'N, 124°26'W
47°23'N, 124°30'W
46°15'N, 124°11'W (2684)
43°51'N, 124°13'W
46°08'N, 124°04'W
44°20'N, 124°20'W
44°40'N, 124°26'W
45°34'N, 124°02'W
(2684)

ARTHROPODA - CRUSTACEA - Copepoda

Calocalanus styliremis - (2684)

Coll: Wash: 46°57'N, 124°18'W
48°27'N, 124°45'W
46°27'N, 124°12'W
Ore: 45°52'N, 124°00'W
45°57'N, 124°11'W
46°04'N, 124°18'W
46°08'N, 124°04'W
43°51'N, 124°13'W
46°15'N, 124°11'W
46°28'N, 124°26'W
46°39'N, 124°16'W (2684)
45°52'N, 124°00'W
45°34'N, 124°02'W
45°48'N, 124°19'W
45°43'N, 124°25'W
(2684)

Calocalanus tenuis - (2684)

Coll: Wash: 48°27'N, 124°45'W; 46°57'N, 124°18'W (2684);
Ore: 43°51'N, 124°13'W

Candacia bipinnata Giesbrecht - (2341)

Coll: Oregon (2341)

Candacia columbiae Campbell - (2341)

Coll: Washington and Oregon, 45°48'N, 124°19'W (2684) (2341)

Centraugaptilus porcellus Johnson - (2341)

Coll: Oregon (2341)

Centropages sp. - (2684)

Coll: Washington to Oregon, 47°23'N, 124°30'W (2684)

Centropages abdominalis - (2684) (2553,p40)

Dist: B. C. to Oregon (2684)
Coll: Wash: 46°15'N, 124°11'W
47°11'N, 124°19'W
48°16'N, 123°41'W
48°23'N, 124°52'W
46°27'N, 124°12'W
Ore: 45°47'N, 124°11'W
46°04'N, 124°18'W
45°33'N, 124°02'W
44°24'N, 124°18'W
45°34'N, 124°02'W
44°20'N, 124°20'W
44°36'N, 124°18'W
45°13'N, 124°16'W

Centropages mcmurrichi Willey - (2548,p7)

Coll: Oregon (2548,p7)

Charopinus dentatus (Wilson)

Dist: Oregon to Calif. (3133,p790)
Coll: Ore: Coos Bay, Cape Kiwanda (3133,p790); Calif: Pacific Grove (3133,p790)
Remarks: Parasitic on *Raja binoculata*

ARTHROPODA - CRUSTACEA - Copepoda

Chirundina streetsi Giesbrecht - (2341)
Coll: Oregon (2341)

Clausocalanus arcuicornis (Dana) - (2341)
Clausocalanus Acuicornis (Dana) - (2553)
Coll: Wash: Puget Sound (2553); Ore: 45°33'N, 124°02'W (2684)

Clausocalanus dubius Brodsky - (2341)
Coll: Oregon (2341)

Clausidium vancouverense (Haddon, 1912) - (2033,p126)
Coll: Central Calif. (2033,p126)
Hab: On *Callianassa* and *Upogebia* (2033,p126)

Clausocalanus arcuicornis forma *major* - (2684)
Coll: Wash: 46°28'N, 124°26'W (2684)
Ore: 42°58'N, 124°37'W
44°20'N, 124°20'W
45°48'N, 124°19'W
45°52'N, 124°00'W
44°36'N, 124°08'W
45°57'N, 124°11'W
(2684)

Clausocalanus arcuicornis forma *minor* - (2684)
Coll: Wash: 46°27'N, 124°12'W
46°28'N, 124°26'W
46°15'N, 124°11'W
47°11'N, 124°19'W
46°17'N, 124°21'W
46°57'N, 124°18'W (2684)
Ore: 45°43'N, 124°25'W
42°58'N, 124°37'W
44°20'N, 124°20'W
44°40'N, 124°26'W
45°34'N, 124°02'W
45°52'N, 124°00'W
45°13'N, 124°16'W
43°51'N, 124°13'W
45°48'N, 124°19'W
46°04'N, 124°18'W
45°57'N, 124°11'W
(2684)

Clausocalanus pergens - (2684)
Coll: Wash: 46°57'N, 124°18'W
48°27'N, 124°45'W
46°25'N, 124°33'W
46°15'N, 124°11'W
46°27'N, 124°12'W
(2684)
Ore: 46°04'N, 124°18'W
44°20'N, 124°20'W
45°43'N, 124°25'W
45°48'N, 124°19'W
45°13'N, 124°16'W
43°51'N, 124°13'W (2684)

ARTHROPODA - CRUSTACEA - Copepoda

Clytemnestra rostrata (Brady) - (2658,p7)
Dist: Washington to Oregon (2548,p7) (2684)
Coll: Washington and Oregon, 46°04'N, 124°18'W (2684)

Corycaeus sp. - (2548,p7)
Dist: Oregon (2548,p7)

Corycaeus anglicus - (2684)

Coll:	Wash:	48°23'N, 124°52'W	48°27'N, 124°45'W (2684)
	Ore:	45°48'N, 124°19'W	46°04'N, 124°18'W (2684)

Ctenocalanus vanus - (2684)

Coll:	Wash:	46°57'N, 124°18'W	46°15'N, 124°11'W
		48°27'N, 124°45'W	46°17'N, 124°21'W
		47°47'N, 124°53'W	48°23'N, 124°52'W
		46°27'N, 124°12'W	48°16'N, 123°41'W
		46°25'N, 124°33'W	(2684)
	Ore:	45°52'N, 124°00'W	45°47'N, 124°11'W
		45°34'N, 124°02'W	46°04'N, 124°18'W
		44°40'N, 124°26'W	45°48'N, 124°19'W
		44°20'N, 124°20'W	44°07'N, 124°22'W
		44°24'N, 124°18'W	45°43'N, 124°25'W
		43°51'N, 124°13'W	42°58'N, 124°37'W (2684)

Epilabidocera amphitrities (McMurrich) - (2341)
Coll: Washington (2341); Ore: 45°48'N, 124°19'W; 45°13'N, 124°16'W (2684)

Epilabidocera longipedata (Sato) - (2341)
Coll: Oregon (2341)

Eucalanus attenuatus (Dana) - (2341)
Coll: Oregon (2341)

Eucalanus bungii Giesbrecht - (2341)
Eucalanus bungii bungii Johnson 1938 - (2553)
Coll: Wash: 46°25'N, 124°33'W, Puget Sound (2553,p34)
46°15'N, 124°11'W; 46°28'N, 124°26'W (2684);
Ore: 45°34'N, 124°02'W; 46°04'N, 124°18'W;
45°48'N, 124°19'W (2684)

Eucalanus bungii bungii - (2684)
See *Eucalanus bungii*

ARTHROPODA - CRUSTACEA - Copepoda

Eucalanus bungii californicus - (2684)
Coll: Ore: 44°20'N, 124°20'W; 45°33'N, 124°02'W; 42°58'N, 124°37'W (2684)

Eucalanus elongatus hyalinus Giesbrecht - (2341)
Coll: Oregon (2341)

Euchaeta spinosa Giesbrecht - (2341)
Coll: Oregon (2341)

Euchirella curticauda (Giesbrecht) - (2341)
Coll: Oregon (2341)

Euchirella galeata Giesbrecht - (2341)
Coll: Oregon (2341)

Euchirella pulchra (Lubbock) - (2341)
Coll: Oregon (2341)

Euchirella rostrata (Claus) - (2341)
Coll: Oregon (2341)

Eurytemora americana - (2684)
Coll: Washington and Oregon, 46°27'N, 124°12'W

Gaetanus simplex Brodsky - (2341)
Coll: Oregon (2341)

Gadius tenuispinus (G. O. Sars) - (2341)
Coll: Oregon (2341)

Gaussia princeps (T. Scott) - (2341)
Coll: Oregon (2341)

Giadius brevispinus (G. O. Sars) - (2341)
Coll: Oregon (2341)

Giadius pungens Giesbrecht - (2341)
Coll: Oregon (2341)

Giadius variabilis Brodsky - (2341)
Coll: Oregon (2341)

ARTHROPODA - CRUSTACEA - Copepoda

Haloptilus pseudooxycephalus Brodsky - (2341)
Coll: Oregon (2341)

Heterorhabdus sp. - (2684)
Coll: Wash: 46°25'N, 124°33'W; Oregon (2684)

Heterorhabdus norvegicus - (2684)
Coll: Washington; Oregon, 45°13'N, 124°16'W (2684)

Heterorhabdus papilliger (Claus) - (2341)
Coll: Washington (2684); Oregon, 45°28'N, 124°26'W (2684)

Heterorhabdus tanneri (Giesbrecht) - (2341)
Heterorhabdus poximus Davis - (2648)
Coll: Washington (2684); Oregon, 46°04'N, 124°18'W (2684)

Heterostylites longicornis (Giesbrecht) - (2341)
Coll: Oregon (2341)

Heterostylites major (Dahl) - (2341)
Coll: Oregon (2341)

Lepeophthirus pravipes Wilson
Dist: B. C. to Calif. (3133,p778)
Remarks: Parasite of Sculpins

Lophothrix frontalis Giesbrecht - (2341)
Coll: Oregon (2341)

Lubbockia squillimana Claus - (2341)
Coll: Oregon (2341)

Lucicutia bicornuta Wolfenden - (2341)
Coll: Oregon (2341)

Lucicutia flavicornis (Claus) - (2341) (2548,p7)
Coll: Wash: 46°27'N, 124°12'W   46°28'N, 124°26'W
Ore: 45°43'N, 124°25'W   46°08'N, 124°04'W
45°13'N, 124°16'W   45°48'N, 124°19'W
(2684) (2648,p7)

ARTHROPODA - CRUSTACEA - Copepoda

Mixtocalanus robustus Brodsky - (2341)
Coll: Oregon (2341)

Mytilicola orentalis Mari
Coll: Wash: Puget Sound (3062)
Remarks: Parasite on Crassostrea gigas Thunberg, Puget Sound (3062), in digestive diverlicua of C. gigas (3226)

Oithona plumifera Baird - (2341)
Coll: Oregon (2341)

Oithona similis Claus - (2548, p7)
Coll: Wash: 46°57'N, 124°18'W
48°27'N, 124°45'W
47°23'N, 124°30'W
48°23'N, 124°52'W
47°11'N, 124°19'W
48°16'N, 123°41'W
46°39'N, 124°16'W
46°15'N, 124°11'W
46°17'N, 124°21'W
47°47'N, 124°53'
46°28'N, 124°26'W
46°27'N, 124°12'W
46°25'N, 124°33'W
Ore: 45°52'N, 124°00'W
45°34'N, 124°02'W
44°40'N, 124°26'W
44°20'N, 124°20'W
44°07'N, 124°22'W
46°08'N, 124°04'W
43°51'N, 124°13'W
44°24'N, 124°18'W
45°57'N, 124°11'W
46°04'N, 124°18'W
45°48'N, 124°19'W
45°33'N, 124°02'W
44°36'N, 124°08'W
45°43'N, 124°25'W
42°58'N, 124°37'W
45°13'N, 124°16'W (2684)
Remarks: A very common and important organism.

Oithona spinirostris Claus - (2548, p7)
Coll: Wash: 46°57'N, 124°18'W
48°27'N, 124°45'W
47°23'N, 124°30'W
48°23'N, 124°52'W
47°11'N, 124°19'W
48°16'N, 123°41'W
46°39'N, 124°16'W
46°15'N, 124°11'W
46°17'N, 124°21'W
47°47'N, 124°53'W
46°28'N, 124°26'W
46°27'N, 124°12'W
46°25'N, 124°33'W
(2684)
Ore: 45°52'N, 124°00'W
45°34'N, 124°02'W
44°40'N, 124°26'W
44°20'N, 124°20'W
44°07'N, 124°22'W
44°24'N, 124°18'W
46°08'N, 124°04'W
43°51'N, 124°13'W
45°47'N, 124°11'W
46°04'N, 124°18'W
45°48'N, 124°19'W
45°33'N, 124°02'W
44°36'N, 124°08'W
45°13'N, 124°16'W
45°43'N, 124°25'W
42°58'N, 124°37'W (2548)

ARTHROPODA - CRUSTACEA - Copepoda

Metridia curticauda Giesbrecht - (2341)
Coll: Oregon (2341)

Metridia lucens Boeck - (2341)
Coll: Wash: 46°47'N, 124°18'W
46°17'N, 124°21'W
48°23'N, 124°52'W
46°28'N, 124°26'W
46°25'N, 124°33'W
Ore: 45°52'N, 124°00'W
45°34'N, 124°02'W
45°48'N, 124°19'W
45°33'N, 124°02'W
45°13'N, 124°16'W
45°43'N, 124°25'W
42°58'N, 124°37'W
46°15'N, 124°11'W
47°47'N, 124°53'W
48°16'N, 123°41'W
47°11'N, 124°19'W
(2684)
45°57'N, 124°11'W
46°04'N, 124°18'W
44°20'N, 124°20'W
44°07'N, 124°22'W
46°08'N, 124°04'W
43°51'N, 124°13'W
(2684)

Metridia pacifica Brodsky - (2341)
Coll: Oregon (2341)

Microcalanus pusillus G. O. Sars - (2341)
Coll: Wash: 48°23'N, 124°52'W
46°25'N, 124°33'W
Ore: 44°07'N, 124°22'W
44°24'N, 124°18'W
48°16'N, 123°41'W
(2684)
44°36'N, 124°08'N
(2684)

Microsetella sp. - (2548, p7)
Coll: Oregon (2548, p7)

Microsetella norvegica (Boeck, 1864) - (2553) (2684)
Dist: B. C. to Oregon (2553, p48)
Coll: Ore: 45°43'N, 124°25'W; 45°13'N, 124°16'W;
44°17'N, 124°22'W (2684)

Microsetella rosea (Dana 1852) - (2684) (2553, p48)
Dist: B. C. to Oregon
Coll: Wash: 46°17'N, 124°21'W
Ore: 45°48'N, 124°19'W
44°40'N, 124°26'W
46°28'N, 124°26'W
44°24'N, 124°18'W
46°04'N, 124°18'W
Remarks: Mid-depth, common (2553, p48)

ARTHROPODA - CRUSTACEA - Copepoda

Oncaea sp. - (2684)
Coll: Wash: 46°15'N, 124°11'W
46°28'N, 124°26'W
Ore: 45°57'N, 124°11'W
46°04'N, 124°18'W
45°48'N, 124°19'W
46°17'N, 124°21'W
(2684)
45°34'N, 124°02'W
44°40'N, 124°26'W

Oncaea borealis Sars 1918 - (2684) (2553,p45)
Dist: B. C. to Oregon
Coll: Ore: 45°13'N, 124°16'W
Remarks: Mid-depth, deep, common (2553,p45)

Oncaea conifera Giesbrecht - (2548,p7)
Coll: Wash: 56°04'N, 124°18'W
48°16'N, 123°41'W
Ore: 44°07'N, 124°22'W
45°48'N, 124°19'W
(2684)

Oncaea media - (2684)
Coll: Wash: 47°11'N, 124°19'W
Ore: 44°24'N, 124°18'W
48°16'N, 123°41'W (2684)
44°36'N, 124°08'W (2684)

Oncaea tenella pacifica - (2684)
Coll: Wash: 48°27'N, 124°45'W
48°23'N, 124°52'W
46°25'N, 124°33'W
Ore: 44°20'N, 124°20'W
44°36'N, 124°08'W
45°13'N, 124°16'W
45°43'N, 124°25'W
47°47'N, 124°53'W
48°16'N, 123°41'W
46°39'N, 124°16'W (2684)
44°07'N, 124°22'W
44°24'N, 124°18'W
46°08'N, 124°04'W
(2684)

Paracalanus aculeatus - (2684)
Coll: Wash: 47°11'N, 124°19'W
Oregon (2684)
46°28'N, 124°26'W

Paracalanus parvus (Claus) - (2341)
Coll: Wash: 46°08'N, 124°04'W
48°16'N, 123°41'W
47°11'N, 124°19'W
48°23'N, 124°52'W
46°17'N, 124°21'W
46°15'N, 124°11'W
46°39'N, 124°16'W
46°27'N, 124°12'W
46°28'N, 124°26'W
47°23'N, 124°30'W
48°27'N, 124°45'W
46°57'N, 124°18'W

Paracalanus parvus (Claus) - continued
Ore: 42°58'N, 124°37'W
45°43'N, 124°25'W
44°24'N, 124°18'W
44°40'N, 124°26'W
45°57'N, 124°11'W
43°51'N, 124°13'W
45°13'N, 124°16'W
45°48'N, 124°19'W
45°34'N, 124°02'W
45°52'N, 124°00'W

Paraeucheata sp. - (2684)
Coll: Wash: 46°25'N, 124°33'W
Oregon (2684)
46°25'N, 124°33'W (2684)

Paraeuchaeta elongata - (2684)
Coll: Washington; Ore: 44°20'N, 124°20'W; 46°04'N, 124°18'W; 45°13'N, 124°16'W (2684)

Paranthessius columbiae (Thompson, 1897) - (2033,pl27)
Coll: Central Calif. coast (2033,pl27)
Hab: On gills of clams Schizothaerus and Protothaca (2033,pl27)

Paranthessius perplexus Illg, 1949 - (2033,pl27)
Coll: Central Calif. coast (2033,pl27)
Hab: From Washington clam, Saxidomus (2033,pl27)

Paranthessius saxidomi Illg, 1949 - (2033,pl27)
Coll: Central Calif. (2033,pl27)
Hab: From Washington clam, Saxidomus (2033,pl27)

Paranthessius tivelae Illg, 1949 - (2033,pl27)
Coll: Central Calif. coast (2033,pl27)
Hab: From Pismo clam, Tivela (2033,pl27)

Paranthessius panopeae Illg, 1949 - (2033,pl27)
Coll: Central Calif. coast (2033,pl27)
Hab: From geoduck, Panope (2033,pl27)

Pareuchaeta birostrata Brodsky - (2341)
Coll: Oregon (2341)

Pareuchaeta japonica (Marukawa) - (2341)
Coll: Oregon (2341)

ARTHROPODA - CRUSTACEA - Copepoda

Phaenna spinifera Claus - (2341)
Coll: Oregon (2341)

Pleuromamma sp. - (2684)
Coll: Ore: 44°20'N, 124°20'W

Pleuromamma abdominalis (Lubbock) - (2341)
Coll: Oregon (2341)

Pleuromamma borealis (Dahl) - (2341)
Coll: Oregon (2341)

Pleuromamma quadrungulata (Dahl) - (2341)
Coll: Oregon (2341)

Pleuromamma scutullata Brodsky - (2341)
Coll: Oregon (2341)

Pleuromamma xiphias (Giesbrecht) - (2341)
Coll: Oregon (2341)

Pseudocalanus minutus (Krøyer) - (2341)
Coll: Wash: Grays Harbor (3635)
46°15'N, 124°11'W
46°17'N, 124°21'W
47°47'N, 124°53'W
46°28'N, 124°26'W
46°27'N, 124°12'W
46°25'N, 124°33'W
Ore: 45°52'N, 124°00'W
45°34'N, 124°02'W
44°40'N, 124°26'W
44°20'N, 124°20'W
44°07'N, 124°22'W
44°24'N, 124°18'W
46°08'N, 124°04'W
43°51'N, 124°13'W
46°57'N, 124°18'W
48°27'N, 124°45'W
47°23'N, 124°30'W
48°23'N, 124°52'W
47°11'N, 124°19'W
48°16'N, 123°41'W
46°39'N, 124°16'W
45°57'N, 124°11'W
46°04'N, 124°18'W
45°48'N, 124°19'W
45°33'N, 124°02'W
44°36'N, 124°08'W
45°13'N, 124°16'W
45°43'N, 124°25'W
42°58'N, 124°37'W (2684)
Temp: Size development and fecundity are function of temp. but do vary geographically (2699)
Hab: Inshore coastal area (3635)

ARTHROPODA - CRUSTACEA - Copepoda

Pseudochirella polyspina Brodsky - (2341)
Coll: Oregon (2341)

Pseudodiaptomus euryhalinus Johnson, 1939 - (2033,pl26)
Coll: Calif: central coast (2033,pl26), San Francisco Bay
Hab: Intertidal, especially in hypersaline water (2033,pl26)

Racovitzanus antarcticus Giesbrecht - (2341)
Coll: Ore: 45°13'N, 124°16'W (2684)

Racovitzanus pacificus (Esterly) - (2341)
Coll: Oregon (2341)

Racovitzanus porrecta (Giesbrecht) - (2341) (2548)
Racovitzanus Porrectus (Giesbrecht)
Coll: Oregon (2341)

Rhincalanus nasutus Giesbrecht - (2548,p6)
Coll: Oregon (2548,p6)

Scaphocalanus sp. - (2684)
Coll: Washington and Oregon, 45°13'N, 124°16'W

Scaphocalanus brevicornis G. O. Sars - (2341)
Coll: Oregon (2341)

Scaphocalanus magnus (T. Scott) - (2341)
Coll: Oregon (2341)

Scaphocalanus medius (G. O. Sars) - (2341)
Coll: Oregon (2341)

Scaphocalanus minutus Tanaka - (2341)
Coll: Oregon (2341)

Scaphocalanus subelongatus Brodsky - (2341)
Coll: Oregon (2341)

Scolecithricella minor (Brady) - (2341)
Scolecithricella minor var. *orientalis* Brodsky - (2548,p6)
Coll: Wash: 46°28'N, 124°26'W 46°25'N, 124°33'W
Ore: 45°57'N, 124°11'W 46°04'N, 124°18'W
45°48'N, 124°19'W 44°07'N, 124°22'W
44°36'N, 124°08'W 44°24'N, 124°18'W
45°13'N, 124°16'W (2684) (2341)

ARTHROPODA - CRUSTACEA - Copepoda

Scolecithricella ovata (Farran) - (2341)
Coll: Ore: 45°13'N, 124°16'W (2684) (2341)

Scottocalanus persecans (Giesbrecht) - (2341)
Coll: Oregon (2341)

Scottocalanus sedatus Ferran - (2341)
Coll: Oregon (2341)

Tigriopus californicus (Baker, 1912) - (2033,pl26)
Tigriopus triangulus Campbell
Dist: Alaska to lower Calif. (3650)
Coll: Central Calif. coast (2033,pl26), Trinidad Head (3650)
Hab: Intertidal (2033,pl26), high rocky splash pools (3650)
Feeding: Blue green algae - Phormidium (3650)
Temp: Tolerates temps. up to 39°C (3650)
Salinity: Tolerates 2-90‰, salt shock induced 90-175‰ but recovers if returned to normal sea water
Misc: For information on population, reproduction, morphology and environmental relationships see (3650)

Tortanus discaudatus (Thompson and Scott) - (2341)

Coll:	Wash:	47°11'N, 124°19'W	46°27'N, 124°12'W
	Ore:	45°57'N, 124°11'W	44°40'N, 124°26'W
		45°48'N, 124°19'W	45°33'N, 124°02'W
		44°36'N, 124°08'W	45°13'N, 124°16'W (2684)

Undeuchaeta intermedia A. Scott - (2341)
Coll: Oregon (2341)

Undeuchaeta major Giesbrecht - (2341)
Coll: Oregon (2341)

Undeuchaeta plumosa (Lubbock) - (2341)
Coll: Oregon (2341)

ARTHROPODA - CRUSTACEA - Cirripedia

Class: BRANCHIURA

Argulus pugettensis Dana
Hab: Ectoparasites of marine perch (2033,pl28)

Subclass: Cirripedia (Barnacles)

Alepas pacifica Pilsbry, 1907 - (2033,pl33)
Coll: Calif. (2033,pl33)
Hab: Found attached to large medusae, usually *Phacellophora* (2033,pl33)

Balanus aquila Pilsbry, 1907 - (2033,pl33)
Coll: Central Calif. (2033,pl33)
Hab: Intertidal (2033,pl33)

Balanus balanus (Linnaeus) 1758 - (2560,p25)
Dist: Cosmopolitan, northern Atlantic, Pacific and Arctic Oceans; on Pacific coast, south to Puget Sound; recorded by Henry from Langara Island and Seymour Inlet, B. C. (type *balanus*); and from Queen Charlotte Sound, Seymour Inlet and Wentworth Island, B. C. (*pugetensis*) (2560,p25)

Balanus cariosus (Pallas, 1788) - (2033,pl33) (3804,pl15)
Dist: B. C., Puget Sound to central Calif. (2033,pl33) (3804,pl55)
Hab: Intertidal (2033,pl33) (3804,pl15)
Remarks: Food source for many marine animals; swimming larval stage eaten by plankton feeders; adults by whelks, starfishes, crabs (3804,pl15)

Balanus crenatus Bruguière, 1789 - (2033,pl33)
Dist: Puget Sound (2031,p325) to central Calif. (2033,pl33)
Coll: Ore: Newport, 40-42m (2233)
Hab: Intertidal

Balanus engbergi Pilsbry 1921 - (2560,p31)
Dist: Alaska to Oregon, rare; only known B. C. specimens dredged off Victoria (2560,p31)

ARTHROPODA - CRUSTACEA - Cirripedia

Balanus flos Pilsbry, 1907 - (2033,pl33)
Coll: Central Calif. (2033,pl33)
Hab: Usually overgrown by sponges (2033,pl33)

Balanus glandulus - (2560,p33)
Balanus glandula Darwin 1854 - (2033,pl33)
Dist: Alaska to Calif. (2560,p33)
Hab: Intertidal (2033,pl33), abundant on rocks of intertidal zone in B. C. (2560,p33), cannot survive beneath mussels (2233,p250), in biotic succession of Mytilus californianus community (2233,p246)

Balanus hesperius Pilsbry 1916 - (2560,p35)
Dist: Northeastern Pacific Ocean, from Bering Sea to Monterey, Calif.

Balanus nubilis Darwin, 1854 - (2033,pl33) (Giant Barnacle)
Dist: Puget Sound (2031,p329) to central Calif. (2033,pl33)
Hab: Low intertidal (2033,pl33)

Balanus tintinnabulum (Linnaeus, 1758) - (2033,pl33)
Coll: Central Calif. (2033,pl33)
Hab: Low intertidal, below mussel beds and on floats (2033,pl33)

Chthamalus dalli Pilsbry, 1916 - (2033,pl33)
Coll: Central Calif. (2033,pl33)
Hab: Intertidal (2033,pl33)

Chthamalus fissus Darwin, 1854 - (2033,pl33)
Coll: Central Calif. (2033,pl33)
Hab: Intertidal (2033,pl33)

Chthamalus microtretus Cornwall, 1927 - (2033,pl33)
Coll: Central Calif. (2033,pl33)
Hab: Apparently rare (2033,pl33)

Conchoderma auritum (Linnaeus) 1767 - (2560,pl4)
Dist: World-wide (2560,pl4)
Hab: Found abundantly on Coronula on whales (2560,pl4)

ARTHROPODA - CRUSTACEA - Cirripedia

Conchoderma *virgatum* (Spengler) 1790 - (2560,p16)
Dist: World-wide (2560,p17)
Hab: Authenticated specimen from B. C. waters found 1953 fastened to tip of a *Penella* (parasitic copepod) attached to a fin whale (*Balaenoptera* *physalus*) (2560,p17)

C[illegible]ula *diadema* (Linnaeus) 1767 - (2560,p40)
Dist: Cool to subtropical seas of both hemispheres, wherever humpback whale (*Megaptera* *nodosa*) occurs. It occurs mainly on lips, throat and fins of whale; abundant on all humpbacks inspected in 1926 at Kyuquot Sound and Quatsino Sound; this species has not been seen on any other kind of whale in B. C. (2560,p40)
Coll: B. C.

Coronula *reginae* Darwin 1854 - (2560,p43)
Dist: North and south Atlantic and Pacific Oceans
Coll: B. C.
Hab: Mainly found on humpback whale (*Megaptera* *nodosa*); occurs on lips and flippers of this species throughout its range; single specimens also taken from tail of sperm whale (*Physeter* *macrocephalus*) and from lower jaw of blue whale (*Balaenoptera* *musculus*) (G. C. Pile) (2560,p43); common at Kyuquot Sound in 1926, found on humpbacks in Quatsino Sound in recent years

Cryptolepas *rachianecti* Dall 1872 - (2560,p45)
Dist: Bering Sea to lower Calif. and Korea, Hawaiian Islands (2560,p44)
Hab: Occurs only on gray whale, *Eschrichtius* *glaucus*. It was present in large numbers on all of 10 gray whales at Coal Harbour, Quatsino Sound, in April, 1953 (G. C. Pike) (2560,p44)

Lepas *anatifera* (Linnaeus, 1758) - (2033,p133) (3804,p116) (2728,p226)
Dist: Aleutian Islands to central Calif. (2728,p227) (2033,p133)
Hab: Common on floating timbers (2033,p133) (3804,p116)
Econ: Edible

Lepas fascicularis Ellis and Solander, 1786 - (2033,p133)
Coll: Central Calif. (2033,p133)
Hab: Intertidal (2033,p133)

Lepas hilli (Leach, 1818) - (2033,p133)
Coll: Central Calif. (2033,p133)
Hab: Rare, probably many reports of this species refer to young *anatifera* (2033,p133)

Lepas pectinata Spengler 1793, var. *pacifica* Henry - (2560,p13)
Dist: Biorka Island, Alaska to Short Sands Beach, Oregon (2728,p230)

Mitella polymerus (Sowerby, 1833) - (2033,p133)
Dist: Washington to lower Calif. (2728,p234)
Coll: Puget Sound splash zone (2031,p323)
Hab: Occurs in dense masses associated with *Mytilus californianus* (2033,p133), common in rock crevices where some surf action (3804,p116), in biotic succession of *Mytilus californianus* community (2233,p246-9)

Tetraclita squamosa elegans Darwin, 1854 - (2033,p133)
Coll: Central Calif. (2033,p133)
Hab: Intertidal (2033,p133)

Tetraclita squamosa rebescens Darwin, 1854 - (2033,p133)
Coll: Central Calif. (2033,p133)
Hab: In summer commonly found with masses of larvae in mantle cavity (2033,p133), abundant beneath mussels, *Fucus*, *Pelvetia*, in biotic succession of *Mytilus californianus* community (2233,p246-50)

Subclass: Malacostraca
Order: Mysidacea

This order is poorly known from the area of study. Studies to the north (2553) and south (2033,2686) bracket the area however, and species from these adjacent areas are included herein.

ARTHROPODA - CRUSTACEA - Mysidacea

Acanthomysis macropsis (Tattersall, 1932) - (2553,p97)
Coll: B. C.: Strait of Georgia (2553,p97)

Acanthomysis nephrophthalma Banner, 1948 - (2553,p97)
Coll: B. C.: Johnson Strait and Hecate Strait (2553,p97)

Acanthomysis pseudomacropsis (Tattersall, 1933) - (2553,p96)
Coll: B. C.: Strait of Georgia (2553,p96)

Amblyops abbreviata M. Sars, 1868 - (2553,p94)
Coll: B. C. (2553,p94)
Hab: Oceanic (2553,p94)

Archaeomysis maculata
Coll: Calif: Central coast (2033,p135), Table Bluff to Clam Beach (2686,p32)
Hab: Intertidal (2686,p32), sand of open beach (2033,p135)
Habits: "Highly mobile, redistributing themselves by swimming with the tide." (2686,p32)

Boreomysis californica Ortmann, 1894 - (2553,p95)
Coll: B. C. (2553,p95)
Hab: Oceanic only (2553,p95)

Boreomysis kinkaidi Banner, 1948 - (2553,p93)
Coll: B. C. (2553,p93)
Hab: Oceanic records only (2553,p93)

Boreomysis microps G. O. Sars, 1883 - (2553,p94)
Coll: B. C. (2553,p94)
Hab: Oceanic records only (2553,p94)

Boreomysis rostrata Illig - (2341)
Coll: Oregon (2341)

Boreomysis sp. - (2341)
Coll: Oregon (2341)

Caesaromysis vanclevi Banner, 1948 - (2553,p94)
Coll: B.C. (2553,p94)
Hab: Oceanic records only (2553,p94)

Euchaetomera tenuis G. O. Sars, 1883 - (2553,p95)
Coll: B.C.: Queen Charlotte Island (2553,p95)

ARTHROPODA - CRUSTACEA - Mysidacea

Euchaetomeropsis pacifica Banner, 1948 - (2553,p95)
Coll: B.C.: reported as an oceanic species off Queen Charlotte Islands (2553,p95)

Eucopia unguiculata Willemoes-Suhm, 1875 - (2553,p93)
Coll: B.C. (2553,p93)
Hab: Oceanic records only (2553,p93)

Eucopia sp. - (2341)
Coll: Oregon (2341)

Gnathophausia gigas Willemoes-Suhm - (2341)
Coll: Oregon (2341)

Gnathophausia ingens (Dohrn) - (2341)
Coll: Oregon (2341)

Heteromysis odontops Walker, 1898 - (2553,p97)
Coll: B.C.; Wash: Puget Sound (2553,p97)

Holmsiella anomala Ortmann, 1908 - (2553,p96)
Coll: B.C. (2553,p96)
Hab: Deep, rare (2553,p96)

Inusitatomysis serrata Tattersall, 1951 - (2553,p95)
Coll: B.C.: Queen Charlotte Strait (2553,p95)

Meterythrops robusta S. I. Smith, 1879 - (2553,p96)
Coll: B.C. (2553,p96)
Hab: Oceanic records only (2553,p96)

Mysidella americana Banner, 1948 - (2553,p97)
Coll: B.C.: Queen Charlotte Sound (2553,p97)

Neomysis costata - (2033,p136)
Coll: Central Calif. (2033,p136)
Hab: Found in tide pools and kelp beds of Monterey area (2033,p136)

Neomysis kadiakensis Ortmann, 1908 - (2553,p96)
Coll: B.C.: Indian Arm (2553,p96)

Neomysis mercedis Holmes - (2033,p136)
Coll: Central Calif. (2033,p136)
Hab: Often occurring in swarms in brackish-water bays and estuaries as well as in fresh water (2033,p136)

Neomysis rayii (Murdoch, 1884) - (2553,p96)
Coll: B.C. (2553,p96)
Hab: Deep, rare (2553,p96)

Proneomysis wailesi Tattersall, 1933 - (2553,p97)
Coll: B.C.: Indian Arm (2553,p97)

Pseudomma berkeleyi Tattersall, 1933 - (2553,p94)
Coll: B.C.: Indian Arm, Burrard Inlet (2553,p94)

Pseudomma truncatum S. I. Smith, 1879 - (2553,p94)
Coll: Wash: recorded from Puget Sound, north of Pender Island, Haro Strait (2553,p94)
Hab: Deep, rare (2553,p94)

Stilomysis grandis (Goes, 1863) - (2553,p95)
Coll: B.C.: Howe Sound (2553,p95)

Order: Cumacea

This group is poorly known from the study area, but species reported from adjacent areas are included.

Campylaspis rubicunda (Lilljeborg)
Dist: Amphiboreal, Alaska, Washington (3624)
Coll: Wash: coastal, 117m (3624)

Campylaspis rufa Hart, 1930 - (2553,p101)
Coll: B.C.: Mitlenatch Island, 200m (2553,p101)

Colurostylis occidentalis Calman
Dist: Washington to Calif. (3624)
Coll: Wash: coastal, 15-18m; Ore: coastal (3624)

Cumella vulgaris Hart, 1930 - (2553,p101)
Coll: B.C.: Male, Parry Bay; Female, Brockton Point (2553,p101)
Hab: Surface, rare, spring (2553,p101)

Diastylis alaskensis Calman - (3624)
Dist: Alaska to Puget Sound
Coll: Wash: coastal, 38-155m (3624)
Remarks: Abundant in Puget Sound

ARTHROPODA - CRUSTACEA - Cumacea

Diastylis bidentata Calman, 1912 - (2553,p100)
Dist: Alaska to Washington (3624)
Coll: B.C.: coast (2553,p100); Wash: coast, 15-317m (3624,p20)

Diastylis koreana Calman, 1912 - (2553,p100)
Coll: B.C. (2553,p100)

Diastylis paraspinulosa Zimmer, 1926 - (2553,p100)
Dist: Western Bering Sea to southern Calif. (3624)
Coll: B.C.: coast (2553,p100); Wash: Puget Sound (3624)

Diastylis pellucida Hart, 1930 - (2553,p100)
Dist: B.C. to Washington (3624)
Coll: B.C.: coast, Deep Cove, Burrard Inlet, 120m (2553, p100); Wash: coastal, 15-155m (3624,p20)
Hab: Surface, rare, spring (2553,p100)

Diastylopsis dawsoni Smith
Dist: Alaska to Calif. (3415)
Coll: Wash: coastal, 13-155m (3624,p20); Ore: Albatross Station 2884, 29 fms (3416)
Remarks: Replaced to south by *D. tenuis* Zimmer (3415); *D. tenuis* occurs off southern Calif. on coarse sand 4-37m deep (3415); T 50.2°F (3416)

Eudorella emarginata (Krøyer, 1846) -(2553,p99)
Coll: B.C. (2553,p99)

Eudorella pacifica Hart, 1930 - (2553,p99)
Dist: B.C. to southern Calif. (3624)
Coll: B.C.: coast, Deep Cove, Burrard Inlet, 120m (2553,p99); Wash: coastal, 81-140m (3624)
Hab: Abundant in muddy sediments esp. in Puget Sound (3624)

Eudorella tridentata Hart, 1930 - (2553,p99)
See Ulf Lie (3624,p25)
Coll: B.C.: Departure Bay (2553,p99)

Eudorellopsis biplicata Calman, 1912 - (2553,p100)
Dist: B.C. to Washington (3624)
Coll: B.C.: coast (2553,p100); Wash: Puget Sound

Hemilaprops californiensis Zimmer
Dist: Washington to southern Calif. (3624)
Coll: Wash: coast, 15-50m (3624,p20)
Remarks: Common off southern Calif.

Hemilaprops gracilis Hart, 1930 - (2553,p99)
Coll: B.C.: Male, Rocky Bay, 160m; Female, Mitlenatch Island, 200m (2553,p99)

Lamprops carinata Hart, 1930 - (2553,p100)
Dist: Alaska to Washington (3624,p100)
Coll: B.C.: coast, Berry Point, Burrard Inlet, 25-50m (2553,p100); Wash: coastal, 18-60m (3624)
Hab: Surface, rare, spring (2553,p100)

Lamprops fuscata G. O. Sars, 1865 - (2553,p101)
Coll: B.C. (2553,p101)

Lamprops quadruplicata S. I. Smith, 1879 - (2553,p101)
Coll: B.C. (2553,p101)

Lamprops serrata Hart, 1930 - (2553,p101)
Coll: B.C.: Departure Bay, 20-30m (2553,p101)

Leptostylis villosa G. O. Sars, 1869 - (2553,p100)
Dist: B.C. to Washington, amphiboreal (3624)
Coll: B.C.: coast (2553,p100); Wash: Puget Sound (3624)

Leucon fulvus G. O. Sars, 1865 - (2553,p99)
Coll: B.C. (2553,p99)

Order: Tanaidacea

Anatanais normani (Richardson, 1905)- (2033,p153)
Coll: Central Calif. coast (2033,p153)
Hab: Intertidal (2033,p153)

Leptochelia dubia (Krøyer) - (2750,p16)
Coll: Ore: in trash on light-house beach, Coos Bay region (2750,p16)

Leptochelia sp. - (2033,p153)
Coll: Central Calif. coast (2033,p153)
Hab: Intertidal (2033,p153)

Pagurapseudes laevis Menzies, 1953 - (2033,p153)
Coll: Central Calif. coast (2033,p153)
Hab: Intertidal (2033,p153)

ARTHROPODA - CRUSTACEA - Tanaidacea

Pancolus californiensis Richardson, 1905 - (2033,p153)
Coll: Central Calif. coast (2033,p153)
Hab: Intertidal (2033,p153)

Synapseudes intumescens Menzies, 1949 - (2033,p153)
Coll: Central Calif. coast (2033,p153)
Hab: Intertidal (2033,p153)

Tanais sp. - (2033,p153)
Coll: Central Calif. coast (2033,p153)
Hab: Intertidal (2033,p153)

Order: Isopoda
Suborder: Valvifera

Colidotea rostrata (Benedict) - (2750,p32)
Coll: Ore: Coos Bay (2750,p32)
Hab: On spines of sea urchin *Strongylocentrotus purpuratus* on rocky shores (2750,p32)

Idarcturus hedgpethi Menzies, 1951 - (2033,p154)
Coll: Central Calif. coast (2033,p154)
Hab: Intertidal (2033,p154)

Idothea (*Pentidotea*) *aculeata* (Stafford, 1913) - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Idothea (*Idothea*) *fewkesi* Richardson, 1905 - (2033,p154)
Dist: Oregon to Calif. (2033,p154) (2750,p26)
Coll: Ore: Coos Head (2750,p26); Calif: central coast (2033,p154)
Hab: Intertidal, on floating algae in surf along beach (2033,p154) (2750,p26)

Idothea ochentensis Brandt - (2750,p27)
Coll: Ore: Coos Bay region (2750,p27)

Idothea (*Pentidotea*) *montereyensis* Maloney, 1933 - (2033,p154)
Idothea gracillima, of Richardson, 1905
Dist: Oregon to Calif. (2033,p154) (3505,p7)
Coll: Ore: Newport (3505,p7); Calif: central coast (2033,p154)
Hab: Intertidal, abundant in all *Phyllospadix* beds examined, not found elsewhere; at low tide when collected they are usually at base of blades, hanging upside down (2033, p154) (3505,p7)

Idothea (*Pentidotea*) *montereyensis* Maloney, 1933 - continued
Stomach analysis: Wood, *Phyllospadix*, *Ulva*, sheetlike algae, a Copepod, *Polysiphona*, large square diatoms growing on animals (3505,p10)

Idothea (*Pentidotea*) *resecata* (Stimpson, 1857) - (2033,p154)
Coll: Wash: Puget Sound (2031,p339); Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Idothea (*Idothea*) *rufescens* Fee, 1926 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Idothea (*Pentidotea*) *schmitti* Menzies, 1951 - (2033,p154)
Pentidotea whitei of Richardson, not Stimpson
Dist: Oregon to Calif. (2033,p143) (3505,p7)
Coll: Ore: Newport (3505,p7); Calif: central coast (2033,p154)
Hab: Intertidal, on several species of red algae, *Prionitis lanceolata* and calcareous red algae in heavy surf areas below gooseneck barnacle zone (2033,p154) (3505,p7)
Food: Same as *I. wosnesenskii* (3505,p10)

Idothea (*Pentidotea*) *stenops* (Benedict, 1898) - (2033,p154)
Dist: Oregon to Calif. (2033,p154) (3505,p7)
Coll: Ore: Newport, Boiler Bay, Coos Head to Cape Arago (3505,p7,30); Calif: central coast (2033,p154)
Hab: Intertidal, one speciman found at Boiler Bay clinging to *Rhododermella* (2033,p154) (3505,p7)

Idothea (*Idothea*) *urotoma* Stimpson, 1864 - (2033,p154)
(Female formerly called *I. rectilinea*, also *I. rectilineata*)
Dist: Washington to Calif. (2033,p154) (2050,p155) (2750,p25)
Coll: Wash: Puget Sound (2050,p155); Ore: south of Coos Head (2750,p25); Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Idothea (*Pentidotea*) *whitei* Stimpson
Dist: Washington to Oregon (2050) (2750)
Coll: Wash: Puget Sound, dredged (2050,p155); Ore: Haystack Rock in Tillamook County (2750,p29)

Idothea (*Pentidotea*) *wosnesenskii* (Brandt, 1851) - (2033,p154)
Pentidotea wosnesenskii - (2031); common name "olive green isopod"
Dist: Oregon to Calif. (2033,p154) (2750,p28)
Coll: Ore: Sally's Slough, Boiler Bay, Yaquina Head, Strawberry Hill, Yaquina Bay (3505,p5-6); Calif: central coast (2033,p154)

Idothea (*Pentidotea*) *wosnesenskii* (Brandt, 1851) - continued
Hab: Among algae attached to rocks and piling; abundant in: under rocks, wood, algal masses; rocky coast, backshore under loose boulders, wood (farthest limits of tide); in *Phyllospadix torreyi*; on holdfasts of *Hedophyllum* sp.; other algae. Present but not abundant on holdfasts of *Laminaria* in heavy surf areas; on several species of red algae, *Prionitis lanceolata* and calcareous red algae in heavy surf areas below gooseneck barnacle zone (3505,p8) see also (3505,p5-6), intertidal (2033,p154)
Food: Prefers *Ulva* and other epiphytic algae; eats whatever is available, crustacea and wood for fungi or bacteria associated with it (3505,p10), in *Phyllospadix*, eats same as *I. montereyensis* (3505,p10)

Pentidotea - synonym of *Idothea*

Syndiothea sp. - (3505,p7)
Coll: Ore: Newport (3505,p7)
Hab: Occurs in red algal zone with *I. schmitti* (3505,p7)
Stomach Analysis: Red algal zone: 7 stomachs examined; one whole copepod, other crustaceans and parts, algal debris, a cellular debris, sponge spicules, and sand grains, foraminiferans, possibly some animal cell masses; not much here seems to be shared with other *Idotheids* (3505,p10)

Synidotea consolidata (Stimpson, 1856) - (2033,p154)
S. pettibonae Hatch, 1947)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Synidotea macginitiei Maloney, 1933 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Synidotea ritteri Richardson, 1904 - (2033,p154)
Coll: Ore: Coos Head (2750,p31); Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154), among rocks near U. S. Coast Guard station at Coos Head (2750,p31)

Suborder: Bopyroidea

Argeia pugettensis Dana, 1853 - (2033,p153)
Coll: Ore: south of Coos Bay (2750,p35); Calif: central coast (2033,p153)
Hab: In branchial cavity of shrimp *Crago* (2033,p153) (2750,p35)

ARTHROPODA - CRUSTACEA - Isopoda

Cryptothir sp. - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Internal parasite of barnacles (2033,p153)

Ione sp. - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Branchial chamber of *Callianassa* (2033,p153)

Phryxus sp. - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Abdomen of *Spirontocaris* (2033,p153)

Phyllodurus abdominalis Stimpson, 1857 - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Abdomen of *Upogebia* (2033,p153)

Portunion (?) sp. - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Hepatic tissue of *Hemigrapsus oregonensis* (2033,p153)

Pseudione sp. - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Branchial chamber of *Pagurus* (2033,p153)

Stegophryxus sp. - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Abdomen of *Pagurus* (2033,p153)

Leptochelia dubia (Krøyer) - (2750,p16)
Coll: Ore: Coos Bay region (2750,p16)
Hab: Found in trash (2750,p16)

Suborder: Oniscoidea

Alloniscus cornutus Budde-Lund, 1885 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Alloniscus mirabilis (Stuxberg, 1875) - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Alloniscus perconvexus Dana, 1854 - (2033,p155)
Coll: Ore: south of Coos Head (2750,p36); Calif: Table Bluff to Clam Beach (2686,p32)
Hab: Intertidal (2033,p155) (2686,p32)

ARTHROPODA - CRUSTACEA - Isopoda

Armadillidium vulgare (Latreille, 1804) - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Armadilloniscus caronacapitalis Menzies, 1950 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Armadilloniscus holmesi Arcangeli, 1933 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Armadilloniscus lindahli (Richardson, 1905)- (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Cubaris affinis (Dana, 1854-1855) - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Cubaris californica (Budde-Lund, 1885) - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Cubaris microphthalma Arcangeli, 1932 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Ligia exotica Roux, 1828 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Ligia occidentalis Dana, 1853 - (2033,p155)
Coll: Ore: Coos Head (2750,p38); Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Ligia pallasii Brandt, 1833 - (2033,p155)
Coll: Ore: south of Coos Head (2750,p39); Calif: central coast (2033,p155)
Hab: Intertidal, on rocky cliffs along coast, in cracks of piling (2033,p155) (2750,p39)

Ligidium gracilis (Dana, 1854-1855) - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

ARTHROPODA - CRUSTACEA - Isopoda

Ligidium hypnorum (Cuvier, 1792) - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Ligidium latum Jackson, 1932 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Philoscia richardsonae Holmes and Gay, 1909 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Porcellio formosus Stuxberg, 1875 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Porcellio (Mesoporcellio) laevis Latreille, 1804 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Porcellio scaber Latreille - (2750,p37)
Dist: Probably most cosmopolitan of all isopods (2750,p37)
Coll: Ore: Coos Head (2750,p37)
Hab: Found under wood and boards (2750,p37)

Porcellio (Porcellio) scaber americanus Arcangeli, 1932 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Porcellio (Porcellio) scaber occidentalis Miller, 1936 - (2033,p155)
P. (P.) dilatatus Brandt and Ratzeburg, 1833
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Porcellio (Porcellio) scaber scaber Latreille, 1804 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Porcellionides pruinosus (Brandt, 1833) - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Protrichoniscus heroldi Arcangeli, 1932 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Tylos punctatus Holmes and Gay, 1909 - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Tylos sp. - (2033,p155)
Coll: Calif: central coast (2033,p155)
Hab: Intertidal (2033,p155)

Suborder: Asellota

Antias hirsutus Menzies, 1951 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Asellus tomalensis Harford, 1877 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Iais californica (Richardson, 1904) - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Ianiropsis analoga Menzies, 1952 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Ianiropsis epilittoralis Menzies, 1952 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Ianiropsis kincaidi derjugini Gurjanova, 1933 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Ianiropsis kincaidi kincaidi Richardson, 1904 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Ianiropsis minuta Menzies, 1952 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Ianiropsis montereyensis Menzies, 1952 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

ARTHROPODA - CRUSTACEA - Isopoda

Ianiropsis tridens Menzies, 1952 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Jaeropsis dubia Menzies, 1951 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Jaeropsis dubia var. *paucispinis* Menzies, 1951 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Jaeropsis lobata Richardson, 1899 - (2033,p154)
Coll: Ore: Squaw Island south of Coos Bay (2750,p34); Calif: central coast (2033,p154)
Hab: Intertidal, found in algae on rocky shore (2033,p154) (2750,p34)

Janiralata davisi Menzies, 1951 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Janiralata occidentalis (Walker, 1898) - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Janiralata solasteri (Hatch) - (2146,p132)
Dist: Alaska to Washington (2146,p135)
Coll: Wash: Hood Canal (2146,p135)

Munna chromatocephala Menzies, 1952 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Munna halei Menzies, 1952 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Munna stephenseni Gurjanova, 1933 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

Munna ubiquita Menzies, 1952 - (2033,p154)
Coll: Calif: central coast (2033,p154)
Hab: Intertidal (2033,p154)

ARTHROPODA - CRUSTACEA - Isopoda

Suborder: Flabellifera

Cirolana harfordi (Lockington, 1877) - (2033,p153)
Coll: Ore: Coos Bay region (2750,p18); Calif: central coast (2033,p153)
Hab: Intertidal, under rocks and mussel beds on rocky shores, abundant (2033,p153) (2750,p18)
Habits: A climax species in the biotic succession of Mytilus californianus community (2233,p246)

Cirolana linguifrons (Richardson) - (2750,p17)
Coll: Ore: Coos Bay (2750,p17)
Hab: Dug at mean tide mark from sandy shore, along open ocean and along parts of Coos Bay (2750,p17)

Colanthura squamosissima Menzies, 1951 - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Cyathura munda Menzies, 1951 - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Dynamenella benedicti (Richardson, 1899) - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Dynameme angulata Richardson - (2750,p23)
Coll: Ore: Coos Bay region (2750,p23)
Hab: Found on rocky shores of Coos Bay region among algae, usually spongomorpha (2750,p23)

Dynamene dilatata Richardson, 1899 - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Dynamenella glabra (Richardson, 1899) - (2033,p153)
Dynamene glabra Richardson - (2750,p23)
Coll: Ore: Coos Bay (2750,p23); Calif: central coast (2033,p153)
Hab: Intertidal, among algae on rocky shores south of entrance to Coos Bay (2750,p23)

Excirolana chiltoni (Richardson, 1905) - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

ARTHROPODA - CRUSTACEA - Isopoda

Excirolana linguifrons (Richardson, 1899) - (2033,p153) (Pill Bug)
Coll: Calif: Table Bluff to Clam Beach (2686,p32)
Hab: Intertidal, just above low high-tide line (2033,p153) (2686,p32)

Exosphaeroma amplicauda (Stimpson, 1857) - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Exosphaeroma crenulatum Richardson - (2750,p22)
Coll: Ore: Coos Bay (2750,p22)
Hab: Living on Pterisiphonia woodii on Light-house Beach (2750,p22)

Exosphaeroma octoncum (Richardson, 1897) - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Exosphaeroma oregonensis (Dana) - (2750,p21)
Coll: Ore: Coos Bay region (2750,p21)
Hab: Under rocks covered by tide (2750,p21)

Exosphaeroma rhomburum (Richardson, 1899) - (2033,p153)
Coll: Ore: Coos Bay region (2750,p20); Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Limnoria sp. - (2033,p153)
Summary of general information for the three species of Limnoria
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)
Temp: For review of changes in water temperature on Limnoria and brief reviews of literature and the practical effects of heated water discharges see (3636) (1) A rise in temp. stimulates general boring activity; causes to be active when normally quiescent during winter. (2) Accelerates onset of breeding season in spring; prolongs into autumn and winter. (3) Shorten developmental period of young stages, and thus permit production of a larger number of broods each breeding season (2689,p521). Lower threshold 7-8°C, upper threshold 23°C. Decline in incubation period from 53 days at 9°C to 20 days at 21°C. However, egg viability decreased with increasing temp.(2689,p528). Survival varies inversely with water temp. although mortality was low at cold temp., animals did not bore. Reproduction and migratory behavior can be modified by temp. (2710, p149). 30°C was lethal within short period of time;

Limnoria sp. - continued
15° C was optimum survival but little difference noted between 10-25° C; 20°C optimum temp. for boring; 10° C dropped 1/3.

Limnoria lignorum (Rathke) - (2750, p20)
L. gribble - (3804, p133)
Dist: B.C. to Oregon (3804, p132) (2750, p20); see also (3630)
Coll: Ore: Coos Bay (2750, p20)
Hab: Wood attacked any time, though most infestation takes place in late winter and early spring (3804, p133)
Life History: (3630), eggs in female pouch; when hatched, begin eating wood immediately (3804, p133)
Temp: 28°C median tolerance: 1.0 mg/l of D.O. at 15-16°C and 19-20°C (2710)

Limnoria quadripunctata Holthuis, 1949 - (2033, p153)
Coll: Calif: central coast (2033, p153)
Hab: Intertidal (2033, p153)
Habits: Boring activity in test panels in Monterey Harbor (3808, p340-341)
Temp: See (3636) (2710) (2689, p521-528) for temperature effect on egg development and other; see (2689) (2710) for summary; 28-day median tolerance 0.75 and 0.60 mg/l at 15-16°C and 22-25°C respectively (2710)

Limnoria tripunctata Menzies, 1951 - (2033, p153)
Coll: Calif: central coast (2033, p153)
Hab: Intertidal (2033, p153)
Temp: See (3628) (2689, p521-528) (2710); 28-day median tolerance limits 1.0 and 1.18 mg/l at 15-16°C and 22-25°C respectively (2710)

Livoneca californica Schioedte and Meinert, 1883 - 1884 - (2033, p153)
Coll: Calif: central coast (2033, p153)
Hab: Intertidal (2033, p153)

Livoneca vulgaris Stimpson, 1857 - (2033, p153)
Coll: Ore: shores near mouth of Coos Bay (2750, p19); Calif: central coast (2033, p153)
Hab: Intertidal (2033, p153), parasitic in gills of ling cod, *Ophiodon elongatus* (2750, p19)

Neosphaeroma oregonensis (Dana, 1854-1855) - (2033, p153)
Coll: Calif: central coast (2033, p153)
Hab: Intertidal (2033, p153)

Nerocila californica Schioedte and Meinert, 1881-1883 - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Paracerceis cordata (Richardson, 1899) - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Paranthura elegans Menzies, 1951 - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Rocinela belliceps (Stimpson, 1864) - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Sphaeroma pentodon Richardson, 1904 - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Tecticeps convexus Richardson, 1899 - (2033,p153)
Coll: Calif: central coast (2033,p153)
Hab: Intertidal (2033,p153)

Order: Amphipoda
Suborder: Gammaridea

Allorchestes angustus Dana, 1854 - (2033,p165)
Coll: Ore: Cape Arago, Coos Bay (2342,p23); Calif: central coast (2033,p165)
Hab: Intertidal (2033,p165)

Ampelisca amblyopsoides
Dist: Eastern North Pacific (2554,p122)

Ampelisca brevisimulata
Dist: Eastern North Pacific (2554,p122)

Ampelisca catalinensis
Dist: Eastern North Pacific (2554,p122)

Ampelisca coeca
Dist: Eastern North Pacific (2554,p122)

ARTHROPODA - CRUSTACEA - Amphipoda

Ampelisca cristoides
Dist: Eastern North Pacific (2554,p122)

Ampelisca cucullata
Dist: Eastern North Pacific (2554,p122)

Ampelisca eoa
Dist: Eastern North Pacific (2554,p122)

Ampelisca eschrichti
Dist: Eastern North Pacific (2554,p122)

Ampelisca furcigera
Dist: Eastern North Pacific (2554 ,p122)

Ampelisca hancocki
Dist: Eastern North Pacific (2554,p122)

Ampelisca hermosa
Dist: Eastern North Pacific (2554,p122)

Ampelisca indentata
Dist: Eastern North Pacific (2554,p122)

Ampelisca lobata
Dist: Eastern North Pacific (2554,p122)

Ampelisca macrocephala Lilljeborg, 1852 - (2033,p165) (2554,p122) (2553)
Dist: B. C. to California
Coll: Calif: central coast (2033,p165)
Hab: Intertidal (2033,p165)

Ampelisca mexicana
Dist: Eastern North Pacific (2554,p122)

Ampelisca pacifica
Dist: Eastern North Pacific (2554,p122)

Ampelisca panamensis
Dist: Eastern North Pacific (2554,p122)

Ampelisca plumosa
Dist: Eastern North Pacific (2554,p122)

Ampelisca pugetica
Dist: Eastern North Pacific (2554,p122)

ARTHROPODA - CRUSTACEA - Amphipoda

Ampelisca romigi
Dist: Eastern North Pacific (2554,p122)

Ampelisca schellenbergi
Dist: Eastern North Pacific (2554,p122)

Ampelisca shoemakeri
Dist: Eastern North Pacific (2554,p122)

Ampelisca typica (Bate, 1856) - (2033,p165) (2554,p122)
Coll: Calif: central coast (2033,p165)
Hab: Intertidal (2033,p165)

Ampelisca venetiensis
Dist: Eastern North Pacific (2554,p122)

Amphilochus neopolitanus Della Valle, 1893 - (2033,p165)
Coll: Calif: central coast (2033,p165)
Hab: Intertidal (2033,p165)

Ampithoe eoa Bruggen (?) - (2342,p27)
Coll: Ore: Cape Arago (2342,p27)

Ampithoe humeralis Stimpson, 1864 - (2033,p165)
Coll: Wash: Puget Sound (2050,p136) (2031,p333) (2342,p29); Ore: Cape Arago (2342,p29); Calif: Santa Cruz Island (2342,p29)
Hab: Intertidal, about low water mark (2033,p165) (2050,p136)

Ampithoe lacertosa (Bate, 1858)- (2033,p165)
Coll: Calif: central coast (2033,p165)
Hab: Intertidal (2033,p165)

Ampithoe plumulosa Shoemaker, 1938 - (2033,p165)
Coll: Calif: central coast (2033,p165)
Hab: Intertidal (2033,p165)

Ampithoe pollex Kunkel, 1910 - (2033,p165)
A. indentata (Stout, 1913)
Coll: Ore: Sunset Bay, North Beach, Cape Arago (2342,p29,31); Calif: central and southern (2033,p165) (2342,p29,31)
Hab: Intertidal (2033,p165)

Ampithoe ramondi (Audouin, 1826) - (2033,p165)
Coll: Calif: central coast (2033,p165)
Hab: Intertidal (2033,p165)

ARTHROPODA - CRUSTACEA - Amphipoda

Ampithoe simulans Alderman, 1936 - (2033,p166)
A. dalli Shoemaker, 1938
Dist: Alaska tc Calif. (2342)
Coll: Wash: Puget Sound (2342); Ore: South Cove, Cape Arago (2342,p34); Calif: Moss Beach (2342)
Hab: Intertidal (2033,p166)

Ampithoe valida (S. I. Smith, 1873)- (2033,p166) (See Alderman, 1936)
Coll: Ore: South Slough, Charleston; Calif: Moss Beach (2342, p35)
Hab: Intertidal (2033,p166)

Anisogammarus (Anisogammarus) pugettensis (Dana, 1853) - (2033,p166)
Dist: Alaska to Calif. (2342,p16) (2033,p166)
Coll: Wash: Puget Sound (2342,p16); Ore: Coos Bay region (2342, p15)
Hab: Intertidal (2033,p166)

Anisogammarus (Eogammarus) confervicolus (Stimpson, 1857) - (2033,p166)
Dist: Alaska to Calif. (2033,p166)
Coll: Alaska: Alinchak Bay (2342,p11); Ore: Coos Bay region (2342,p11); Calif: central (2033)
Hab: Intertidal (2033,p166)

Anisogammarus (Eogammarus) remellus (Weckel) - (2342,p16)
Dist: Alaska to Calif: (2342,p16)
Coll: Wash: Puget Sound (2342,p16); Ore: Cape Arago (2342, p16); Calif: Monterey Bay (2342,p16)

Aoroides columbiae Walker, 1898 - (2033,p166)
A. californica Alderman, 1936
Dist: Washington to Calif. (2033,p166) (2342,p26)
Coll: Wash: Puget Sound (2342,p26); Ore: Cape Arago, Sunset Bay (2342,p26); Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Aruga macromerus Shoemaker, 1916 - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Cairella californica Bovallius - (2341)
Coll: Oregon (2341)

Calliopiella (?) *pratti*, Barnard 1954 - (2342,p6)
Coll: Ore: Coos County (2342,p7), Fossil Point, Cape Arago, Coos Bay (2008,p6-7)
Hab: In sargassum, intertidal (2008,p6-7)

ARTHROPODA - CRUSTACEA - Amphipoda

Calliopius laeviusculus (Krøyer, 1838) - (2553) (2033)
Dist: B.C. to Calif. (2342,p8)
Coll: B.C.: coast (2553,p106), Vancouver Island (2342,p8); Wash: Port Townsend (2342,p8); Ore: Depoe Bay (2342,p8)
Hab: Intertidal (2033,p166), surface common in spring (2553)

Ceradocus spinicauda (Holmes) - (2342,p18)
Coll: Ore: Cape Arago (2342,p19); Calif: Channel Islands (2342,p18)
Hab: In algae (2342,p19), 29-45 fms (2342,p18)

Chelura terebrans Philippi, 1839 - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Corophium acherusicum (Costa, 1857) - (2033,p166)
Dist: B.C. to Calif. (2342)
Coll: Ore: Coos Bay region (2342); Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Corophium brevis Shoemaker 1949 - (2342,p36)
Dist: Alaska to Calif. (2342,p36)
Coll: Ore: Coos Bay region (2342,p36); Calif: San Francisco, central coast (2342,p36) (2033,p166)
Hab: Intertidal (2033,p166)

Corophium insidiosum Crawford, 1937 - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Corophium oaklandense Shoemaker, 1949 - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)
Remarks: This species is said to be hermaphroditic.

Corophium salmonis Stimpson - (2342,p36)
Dist: Alaska to Oregon (2342,p36)
Coll: Wash: Puget Sound (2342,p36); Ore: Coos Bay region (2342,p36)

Corophium spinicorne Stimpson, 1857 - (2033,p166)
Dist: Alaska to Calif. (2342,p37)
Coll: Ore: Coos Bay region (2342,p37); Calif: central coast to Santa Cruz County (2342,p37)
Hab: In brackish water (2033,p166)

ARTHROPODA - CRUSTACEA - Amphipoda

Corophium stimpsoni Stimpson, 1857 - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: May be very abundant in nearly fresh water of estuaries (2033,p166)

Dogielinotus sp. - (2686)
Coll: Calif: Fairhaven (2686,p32)
Hab: Intertidal (2686,p32)

Elasmopus antennatus (Stout, 1913) - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Elasmopus brasiliensis (Dana, 1853) - (2033,p166) (See Alderman, 1936)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Elasmopus rapax Costa, 1853 - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Eohaustorius washingtonianus - (2686)
Coll: Calif: Clam Beach, Mad River (2686,p32)
Hab: Intertidal (2686,p32)

Ericthonius brasiliensis (Dana, 1853) - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Ericthonius hunteri (Bate, 1862) - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Eurystheus tenuicornis (Holmes, 1904) - (2033,p166) (See Shoemaker, 1931)
Coll: Calif: central and southern coast (2035,p8)
Hab: Intertidal (2033,p166), 2-5 fms (2035,p8)

Gammarus subtener Stimpson - (2050,p158)
Coll: Wash: Puget Sound (2050,p158)
Hab: Circumlittoral zone (2050,p158)

Hippomedon denticulatus (Bate) - (2342,p4)
Dist: Oregon (2342,p4); Atlantic Ocean from Norway to western Mediterranean (2342,p4)
Coll: Ore: Winchester Bay (2342,p4)
Hab: 20-40 fms (2342,p4), see Alan Hancock Stn. 1471-42 for depth (2342,p4)

Hyale frequens (Stout, 1913) - (2033,p166)
Dist: Oregon to Calif. (2342,p23)
Coll: Ore: Cape Arago, Coos Bay region, Newport (2342,p23);
Calif: Laguna, Lower Calif. (2342,p23)
Hab: Abundant in intertidal (2342,p23)
Remarks: Possibly a color variant of H. rubra (2033,p166).

Hyale grandicornis Krøyer, 1845 - (3765)
Coll: Calif: central (2765)
Hab: Immature found in nuchal cavity and pallial groove of Lottia gigantea, Acmaeapelta, A. scabra, A. digitalis, A. limatula, and A. scutum. The percentage Acmaea species hosting this form increases with decreased height in intertidal region. Appear to settle on algae of limpet shell (3765); mature found on Ulva; migrate to Ulva when sexually mature (2765)

Hyale hawaiensis (Dana, 1853) - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Hyale plumulosus (Stimpson, 1857) - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Hyale pugettensis (Dana, 1853) - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Hyale rubra (Thompson, 1879) - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Hyalella azteca (Saussure, 1858) - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Hyperoche medusarum Krøyer - (2341)
Coll: Oregon (2341)

Ischyrocerus anguipes Krøyer - (2342,p35)
Coll: Wash: Puget Sound; Ore: Cape Arago region, Cape Blanco (2342)

Ischyrocerus parvus Stout, 1913 - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

ARTHROPODA - CRUSTACEA - Amphipoda

Jassa falcata (Montagu, 1808) - (2033,p166)
Coll: Ore: Coos Bay, Cape Blanco (2342,p36); Calif: central coast and southern Calif. (2033,p166)
Hab: Intertidal (2033,p166)

Leucothoe spinicarpa (Abildgard, 1789) (?) - (2033,p166)
Dist: B.C. to Calif. (2033,p166) (2342,p6)
Coll: Wash: Puget Sound (2342,p6); Ore: Cape Blanco (2342,p6); Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Maera inaequipes (Costa, 1851) - (2033,p166)
Dist: Oregon to Calif. (2342,p18)
Coll: Ore: Cape Arago region, Depoe Bay (2342,p18); Calif: central coast, Lower Calif. (2342,p18)
Hab: Intertidal and dredged 60-74 fms (2342,p18)

Mandibulophorus uncirostratus - (2686,p32)
Coll: Calif: Samoa, Fairhaven, Mad River (2686,p32)
Hab: Intertidal (2686,p32)

Melita californica Alderman, 1936- (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Melita nitida S. I. Smith, 1873 - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Melita oregonensis, Barnard, 1954 - (2342,p19)
Coll: Ore: Coos County, Cape Arago (2342,p20)
Hab: Reef, intertidal (2342,p20)

Melita sulca (Stout, 1913) - (2033,p166)
M. Palmata Montagu, 1804 - (2553)
Dist: B.C. to Calif. (2033,p166) (2553,p107)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Nototropis tridens Alderman, 1936 - (2033,p166)
Coll: Calif: central coast (2033,p166)
Hab: Intertidal (2033,p166)

Orchestia traskiana Stimpson, 1857 - (2033,p166)
Dist: Washington to Calif. (2342,p23)
Coll: Ore: Cape Arago (2342,p23); Calif: Magdalena Bay, Lower Calif. (2342,p23), central coast (2033,p166)
Hab: Intertidal (2033,p166) among decaying algae on sand (2342, p23)

ARTHROPODA - CRUSTACEA - Amphipoda

Orchestoidea californiana (Brandt) 1851 - (2342,p24)
Dist: Washington to Calif. (2342,p24)
Coll: Ore: Sunset Bay, Bastendorf Beach, Charleston, Coos Bay region (2342,p24); Calif: Clam Beach to Table Bluff (2686,p32)
Hab: High on beach on dry or damp sand (2686,p32), intertidal (2686,p32), characteristic of clean exposed beaches with fine sand (2033,p166), in algae washed up on beach (2342,p24)

Orchestoidea corniculata Stout, 1913 - (2033,p166)
Coll: Calif: Table Bluff to Clam Beach (2686,p32)
Hab: Found on smaller, sheltered beaches with coarse sand and algal debris (2033,p166), high on beach on dry or damp sand (2686,p32), intertidal (2686,p32)

Orchestia traskiana Stimpson
Dist: Washington to Oregon
Coll: Wash: Puget Sound on beach (2031,p331)
Feeding: On kelp and sea lettuce (2031,p331), scavengers

Panoploea rickettsi Shoemaker - (2035,p1)
Coll: Calif: Moss Landing, Pacific Grove, Monterey Bay (2035,p1)
Hab: Taken from a rock, 50+ fms (2035,p1)

Parallorchestes ochotensis (Brandt, 1851) - (2033,p167)
Dist: Okhotsk Sea to Calif. (2342,p24)
Coll: Ore: Cape Arago (2342,p24); Calif: central coast, Laguna Beach (2342,p24) (2033,p167)
Hab: On algae (2342,p24), intertidal (2033,p167)

Paraphoxus (*Pontharpinia*) *milleri* - (2686)
Coll: Calif: Table Bluff to Clam Beach (2686,p32)
Hab: Low high-tide lines, intertidal (2686,p32)

Parapleustes bairdi (Boeck, 1872) - (2033,p167)
Coll: Calif: central coast (2033,p167)
Hab: Intertidal (2033,p167)

Parapleustes pugettensis (Dana, 1853) - (2033,p167)
Coll: Wash: Puget Sound (2342,p9); Ore: Cape Arago region (2342,p9); Calif: central coast (2033,p167)
Hab: Intertidal (2033,p167)

ARTHROPODA - CRUSTACEA - Amphipoda

Photis californica Stout, 1913 - (2033,p167)
Dist: Oregon to Calif. (2033,p167) (2342,p27)
Coll: Ore: Coos Bay, Winchester Bay (2342,p27)
Hab: Intertidal (2033,p167), 20-40 fms (2342,p27)

Photis conchicola Alderman, 1936 - (2033,p167)
Coll: California (2033,p167)
Hab: Intertidal (2033,p167)

Phronima sedentaria Forskal - (2341) (2553)
Dist: B.C. to Oregon (2341) (2553)
Remarks: Mid-depth, rare

Phronimopsis spinifera Claus - (2341)
Coll: Oregon (2341)

Pleustes depressus Alderman, 1936 - (2033,p167)
Coll: Ore: Cape Arago region (2342,p9); Calif: central coast (2033,p167)
Hab: Intertidal (2033,p167)

Podocerus brasiliensis (Dana, 1853-1855) - (2033,p167)
Coll: Calif: central coast (2033,p167)
Hab: Intertidal (2033,p167)

Podocerus spongicolus Alderman, 1936 - (2033,p167)
Coll: Calif: central coast (2033,p167)
Hab: Intertidal (2033,p167)

Polycheria antarctica (Stebbing, 1875) - (2033,p167)
P. osborni Calman, 1898?
Coll: Wash: Puget Sound (2342,p21); Ore: Cape Arago (2342,p21); Calif: central coast (2033,p167)
Hab: Intertidal (2033,p167)

Pontharpinia obtusidens Alderman, 1936 - (2033,p167)
Coll: Ore: Sunset Bay (2342,p4); Calif: central and southern (2342,p4)
Hab: Intertidal (2033,p167), kelp holdfasts, rocks and sand (2342,p4)

Pontharpinia tridentata, Barnard - (2342,p4)
Coll: Ore: Winchester Bay (2342,p5), Alan Hancock Stn. 1471-42 (2342,p5)
Hab: 20-40 fms (2342,p5)

Pontogeneia inermis (Krøyer, 1838) - (2033,p167)
Dist: Pribiloff Islands to Calif. (2342,p9) (2033,p167)
Coll: Ore: Coos Bay region, Cape Blanco (2342,p9); Calif: central coast (2033,p167)
Hab: Intertidal (2033,p167)

Primno abyssalis Bowman - (2341)
Coll: Oregon (2341)

Primno macropa Guerin - (2341)
Coll: Oregon (2341)

Suborder: Hyperiidea

Cystisoma fabricii Stebbing, 1888 - (2546,p8)
Dist: B.C. to southern Calif., Indo-Pacific (Zanzibar and East Indies), 4°N to 10°S
Coll: Ore: offshore (2546,p8) (2341); Calif: Channel Islands (2546,p8)

Dairella californica Bovallius, 1885 - (2546,p7)
Dist: Oregon to Calif. (2546,p7)
Coll: Ore: Columbia River (2546,p7); Calif: Punta Eugenia, Baja (2546,p7)

Hyperia hystrix Bovallius, 1887 - (2546,p6)
Dist: Sea of Japan, North Pacific to Oregon
Coll: Ore: offshore (2546,p6) (2341)

Hyperoche medusarum Krøyer, 1923 - (2546,p7) 1838 - (2553,p104)
Dist: Alaska to Calif. (2546,p7)
Coll: B.C.: coast (2553,p104); Ore: offshore (2546,p7) (2341)

Lanceola loveni Bovallius, 1885 - (2546,p8)
Dist: Alaska to Oregon (2546,p8)
Coll: Ore: offshore (2546,p8) (2341)

Lycaea pulex Marion, 1875 - (2546,p7)
Dist: Oregon to Calif. (2546,p7)
Coll: Ore: offshore (2546,p7) (2341); Calif: Santa Catalina Island (2546,p7)

Oxycephalus clausi Bovallius, 1887 - (2546,p7)
Dist: B.C. to Oregon, Japan to Honolulu, 27° 30'N, 122° 50'E (2646,p7)
Coll: B.C.: coast (2553,p107); Ore: offshore (2546,p7) (2341)

ARTHROPODA - CRUSTACEA - Amphipoda

Paraphronima crassipes Claus, 1879 - (2546,p7)
Dist: Oregon to Baja Calif. (2546,p7)
Coll: Ore: offshore, Columbia River (2546,p7) (2341)

Paraphronima gracilis Claus, 1879 - (2546,p6)
Dist: Oregon to Calif., northern temperate and tropical regions (2546,p6)
Coll: Ore: offshore (2546,p6) (2341)

Parathemisto pacifica Stebbing, 1888 - (2546,p6)
Dist: B.C. to Oregon, between Japan and Sandwich Islands, Subarctic water from about 50° N, 170°E (2546,p6)
Coll: Ore: offshore (2546,p6) (2341)

Primno abyssalis Bowman, 1953 - (2546,p6)
Dist: Alaska to Calif. (2546,p6)
Coll: Ore: offshore, Columbia River (2546,p6) (2341); Calif: extends below Pt. Conception (2546,p6)

Primno macropa Guerin, 1836 - (2546,p7)
Dist: Alaska to Calif. (2546,p7)
Coll: Ore: offshore (2546,p7) (2341)

Scina crassicornis burmudensis Shoemaker, 1945 - (2546,p8)
Coll: Ore: offshore (2546,p8) (2341)

Streetsia challengeri - (2546,p6)
Coll: Ore: offshore (2546,p6) (2341)

Tryphana malmi Boeck, 1870 - (2546,p6)
Coll: Ore: offshore (2546,p6) (2341)

Vibilia armata Bovallius, 1887 - (2546,p7)
Dist: Eastern Pacific from about 44° N to 35°S (2546,p7)
Coll: Ore: offshore (2546,p7) (2341)

Vibilia propinqua Stebbing, 1888 - (2546,p7)
Dist: Oregon to Mexico (2546,p7)
Coll: Ore: offshore, Columbia River (2546,p7) (2341); Calif: to lower Baja (2546,p7)

Vibilia woltereckі Behning, 1939 - (2546,p8)
Dist: Oregon to Mexico (2546,p8)
Coll: Ore: offshore (2546,p8) (2341); Calif: Extends south to Baja Calif. (2546,p8)

ARTHROPODA - CRUSTACEA - Amphipoda

Suborder: Caprellidea

Caprella angusta Mayer, 1903 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Caprella brevirostris Mayer, 1903 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Caprella californica Stimpson, 1857 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Caprella equilibra Say, 1818 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Caprella gracilior Mayer, 1903 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Caprella incisa Mayer, 1903 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Caprella kennerlyi Stimpson
Coll: Wash: Puget Sound on seaweed (2031,p335)
Hab: On bottom of boat (2050,p156)

Caprella laeviuscula Mayer, 1903 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Caprella pilipalma Dougherty and Steinberg, 1953 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Caprella uniforma La Follette, 1915 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Caprella verrucosa Boeck, 1872 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

ARTHROPODA - CRUSTACEA - Amphipoda

Deutella californica Mayer, 1890 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Metacaprella anomala (Mayer, 1903) - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Metacaprella ferrea (Mayer, 1903) - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Metacaprella kennerlyi (Stimpson, 1864) - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Petrotripus brevis (La Follette, 1915) - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Petrolisthes cinctipes - (2233,p246)
Coll: Central Calif. (2033,p246)
Hab: In biotic succession of Mytilus californianus community (2233,p246)

Tritella laevis Mayer, 1903 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Tritella pilimana Mayer, 1890 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Tritella tenuissima Doughtery and Steinberg, 1953 - (2033,p171)
Coll: Central Calif. (2033,p171)
Hab: Intertidal (2033,p171)

Order: Euphausiacea

Bentheuphausia amblyops G. O. Sars - (2341)
Coll: Oregon (2341)

Euphausia pacifica Hansen, 1911 - (2553,p117)
Dist: B.C. to Oregon
Coll: B.C.: coast (2553,p117); off Oregon (3112) (2626)
Life History, Growth: (3112)
Remarks: Mid-depth to surface, very abundant (2553,p117)

ARTHROPODA - CRUSTACEA - Euphausiacea

Nematobrachion flexipes (Ortmann) Calman - (2341)
Coll: Oregon (2341) (2626)

Nematoscelis difficilis Hansen - (2341)
Dist: B. C. to Oregon (2341) (2553) (2626)

Stylocheiron abbreviatum G. O. Sars - (2341)
Coll: Oregon (2341) (2626)

Stylocheiron longicorne G. O. Sars - (2341)
Coll: Oregon (2341) (2626)

Stylocheiron maximum Hansen - (2341)
Coll: Oregon (2341) (2626)

Tessarabrachion oculatus Hansen - (2341)
Coll: Oregon (2341) (2626)

Thysanoessa gregaria G. O. Sars - (2341)
Coll: Oregon (2341) (2626)

Thysanoessa inspinata Nemoto - (2341)
Coll: Oregon (2341) (2626)

Thysanoessa longipes Brandt - (2341)
Coll: Oregon (2341) (2626)

Thysanoessa parva Hansen - (2341)
Coll: Oregon (2341)

Thysanoessa raschii (M. Sars) Hansen - (2341)
Dist: B. C. to Oregon (2341) (2553, pl17)

Thysanoessa spinifera Holmes - (2341)
Dist: B. C. to Oregon (2341) (2553, pl18) (2626)

Thysanopoda acutifrons Holt and Tattersall - (2341)
Coll: Oregon (2341)

Thysanopoda cornuta Illig - (2341)
Coll: Oregon (2341)

ARTHROPODA - CRUSTACEA - Euphausiacea

Thysanopoda egregia Hansen - (2341)
Coll: Oregon (2341)

Order: Decapoda

Acanthephyra curtirostris Wood-Mason - (2341)
Dist: Oregon (2341) to Gulf of Panama (2184,p33)

Acantholithodes hispidus - (2184,p316)
Dist: Aleutian Islands to Monterey Bay, Calif. (2184,p152)

Aega belliceps Stimpson - (2050)
Coll: Wash: Puget Sound (2050)

Amphithonotus occidentalis Stimpson - (2050,p158)
Coll: Wash: Puget Sound (2050,p158)

Amphithonotus septemdentatus Stimpson - (2050,p158)
Coll: Wash: Puget Sound (2050,p158)
Hab: At and below low-water mark (2050,p158)

Anonyx filiger Stimpson - (2050,p157)
Coll: Wash: Puget Sound (2050,p157)
Hab: In deep water (2050,p157)

Bentheogennema sp. - (2341)
Coll: Oregon (2341)

Bentheogennema borealis Rathbun - (2341)
Coll: Oregon (2341)

Calastacus investigatoris - (2184,p315)
Dist: Aleutian Islands to San Diego (2184,p113)
Coll: Ore: off Cascade Head, 345 fms (2184,p113)

Callianassa californiensis Dana, 1854 - (2033,p186)
Dist: Alaska to lower Calif. (2184,p117)
Coll: Wash: Puget Sound (2031,p353)
Hab: Intertidal (2033,p186), tube dwelling (2031,p353)

ARTHROPODA - CRUSTACEA - Decapoda

Callianassa goniophthalma - (2184,p315)
Dist: Sitka, Alaska to San Miguel Island (2184,p121)

Callianassa longimana - (2184,p315)
Dist: B. C. to Lower Calif. (2184,p118)
Temp: San Francisco Bay, 8.2° to 13.9°C (2184,p119)
Salinity: San Francisco Bay, 18.3 to 31.7‰ (2184,p119)

Cancer antennarius Stimpson, 1856 - (2033,p185)
Dist: B. C. to Lower Calif. (2184,p225)
Coll: Calif: central coast (2033,p185)
Hab: Intertidal (2033,p185)

Cancer anthonyi Rathbun, 1897 - (2033,p185)
Dist: Calif: central to Lower (2184,p219)
Coll: Calif: central coast (2033,p185)
Hab: Intertidal (2033,p185)

Cancer gibbosuius - (2184,p319)
Dist: Alaska to Lower Calif. (2184,p319)
Coll: Alaska: Kodiak (2184,p319); Lower Calif: San Geronimo Island (2184,p319)
Temp: San Francisco Bay, 9.7° to 11.5°C (2184,p227)
Salinity: San Francisco Bay, 33.9‰ (2184,p227)

Cancer gracilis Dana, 1852 - (2033,p185)
Dist: Sitka, Alaska to Lower Calif. (2184,p319)
Coll: Calif: central coast (2033,p185)
Hab: Intertidal (2033,p185)

Cancer magister Dana, 1852 - (2033,p185)
Dist: Aleutian Islands to Lower Calif. (2184,p229)
Coll: Calif: Clam Beach to Table Bluff (2686,p42)
Hab: Shallow waters of bays to open ocean; harvested commercially (very important) from 2-25 fms; prefer sandy bottoms but are found on other types also (2671,p56); sandy bottoms near eel grass (3804,p109); 22-200m (3003); dredged at 5-12 1/2 fms off Coos Bay to Newport by BCF Seattle (3412); dredged at depth shallower and deeper than 14-17 fms off Washington (3413)

See also Chapter 20
p. 255

Cancer magister Dana, 1852 - continued

Relative abundance and distribution figures from Clam Beach to Table Bluff (2686, p42-4); most productive area in Washington is La Push to Columbia River (3635)

Thermal: Migrate along coast of Strait of Juan de Fuca and may be influenced by heated water; tolerances to high temp. or to rapid temp. changes by this species is little known (2730, p247); "The crabs would probably be affected more than would be the clams, but this is completely speculative." (2730, p247); research on larval D. crab shows that when normal temp. and salinity are changed the survival rate is decreased; all larvae died when reared at 71°F for 53 days; 60-65% survived at 64°F, salinity 25-30‰. 25% survival at 64°F and salinity 20‰; optimum temp. and salinity ranges for laboratory cultured D. crabs larvae are 50-57°F and 25-30‰ salinity (3635)

Description and Drawing: (3804, p109-10)

Food: Cockles and other clams (3804, p109)

Repro: Larvae released during winter or early spring and the larvae observed nearshore May-June; young crabs appear as adults during June (3635, p5)

Bibliography: Butler (3611)

Cancer oregonensis (Dana, 1852) - (3003, p10)

Dist: Aleutian Islands to Lower Calif. (2184, p234)

Coll: Wash: Puget Sound (2184) (2031, p379)

Hab: Ore: 46m (3003, p10); Puget Sound: low tide buried in mud and fine sand under rocks (2031, p379)

Cancer productus Randall, 1839 - (2033, p185) (3804, p110)

Dist: Alaska to Lower Calif. (2031, p221)

Hab: Intertidal (2033, p185), gravelly shores, rocky shores (2031, p377), gravelly or rocky bottom or beneath stones (3804, p110)

Econ: Edible, but not used commercially

Chorilia longipes Dana, 1851 - (3003, p10)

Dist: Kodiak to San Diego (2184, p319)

Coll: Oregon, 46-674m (3003, p10)

Hab: 27-603 fms

ARTHROPODA - CRUSTACEA - Decapoda

Crago Fabricius, 1801 - This generic name was placed on the *Official Index of Rejected and Invalid Generic Names in Zoology* as a junior objective synonym of *Crangon* Fabricius, 1798 by Opinion 334 of the International Commission on Zoological Nomenclature. In the same opinion *Crangon* Weber, 1795 was suppressed as a synonym of *Alpheus* Fabricius, 1798. Consequently those shrimp known as *Crago* are now properly placed in *Crangon* and many previously reported as *Crangon* belong to *Alpheus*. We have attempted to place these shrimp in their proper genera in this checklist. The species *Alpheus* appears to be a more southern species, and none has yet been reported from the study area.

Crangon alaskensis elongata (Rathbun) 1902 - (3003,p10) (2184,p88)
Dist: B. C. to Lower Calif. (2184,p88)
Coll: Puget Sound: tidepools (2031,p347); Ore: 23-68m (3003,p10)
Hab: Dredged
Temp: San Francisco Bay, 9.3° to 12.2°C (2184,p88)
Salinity: 33.8-34.3‰ (2184,p88)

Crangon alba Holmes, 1900 - (3003,p10)
Dist: B. C. to San Diego (2184,p89)
Coll: Ore: 25m (3003,p10); Calif: central (2033,p185)
Hab: Intertidal (2033,p185), to 47 fms (2184,p89)

Crangon communis Rathbun, 1899 - (3003,p11)
Dist: Bering Sea to San Diego
Coll: Ore: 73-366m (3003,p11)
Hab: 9-306 fms (2184,p96)

Crangon franciscorum (Stimpson, 1859) - (2033,p185)
Dist: Sitka, Alaska to San Diego (2184,p93,314)
Coll: Central Calif. (2033,p185)
Hab: Intertidal (2033,p185)

Crangon munita - (2184,p315)
Dist: Kodiak, Alaska to San Miguel Island (2184,p98,315)

Crangon munitella - (2184,p315)
Dist: Puget Sound to Santa Catalina Island (2184,p102,315)
Hab: 3 1/2 to 40 fms (2184,p102)

Crangon munitella - continued
Temp: In San Francisco Bay (2184). 11.0° to 13.5°
Salinity: San Francisco Bay, 26.6 to 31.6‰ (2184, p102)

Crangon nigricauda (Stimpson, 1856) - (2033, p185)
Dist: Alaska to Lower Calif. (2184, p85)
Hab: Littoral to 31 fms (2184, p85)

Crangon nigromaculata (Lockington, 1877) - (2033, p185)
Dist: Northern Calif. to Lower Calif. (2184, p87)
Coll: Central Calif. (2033, p185)
Hab: Intertidal (2033, p185), 3-33 fms (2184, p87)

Crangon resima Rathbun, 1902 - (3003, p11)
Dist: Oregon, 118-366m (3003, p11) to Lower Calif. (2184, p97, 315)
Hab: 15 to 266 fms (2184, p97)

Crangon spinosissima - (2184, p315)
Dist: Oregon to San Diego (2184)
Temp: Range 9.3° to 11.4°C (2184, p100)
Salinity: 33.8 to 34.3‰ (2184, p100)

Crangon stylirostris (Holmes, 1900) - (2033, p185)
Dist: Aleutian Islands to Monterey Bay (2184, p91)
Coll: Central Calif. (2033, p185)
Hab: Intertidal (2033, p185), to 26 fms (2184, p91)

Crangon variabilis - (2184, p315)
Dist: Bering Sea to San Nicolas Island (2184, p99)
Hab: 50 to 695 fms (2184, p99)

Cryptolithodes sitchensis Brandt, 1853 - (2033, p186)
Dist: Sitka, Alaska to Monterey Bay (2184, p155, 317)
Coll: Central Calif. (2033, p186)
Hab: Intertidal (2033, p186)

Cryptolithodes typicus - (2184, p317)
Dist: Aleutian Islands to Monterey Bay (2184, p154, 317)

ARTHROPODA - CRUSTACEA - Decapoda

Emerita analoga (Stimpson, 1857) - (2033,p186) (2686,p32) (sand crab)
Dist: Oregon to Lower Calif. (2184,p173,317)
Coll: Calif: central (2033,p186), Table Bluff to Clam Beach (2686,p32)
Hab: Intertidal (2033,p186), sandy beaches (2686,p33), October: edge of surf; March: 100' into the surf; May: 150' from edge of surf, high on beach (2686,p33)

Epialtus productus - (2184,p318)
See Pugettia

Eupagurus kennerlyi Stimpson
Dist: Puget Sound (2050,p153)

Fabia subquadrata Dana, 1851 - (2033,p185)
Dist: Aleutian Islands to Laguna Beach (2184,p254,320)
Coll: Central Calif. (2033,p185)
Hab: Intertidal (2033,p185)

Gennadas incertus Balss - (2341)
Coll: Oregon (2341)

Gennadas propinquus Rathbun - (2341)
Coll: Oregon (2341)

Hapalogaster cavicauda Stimpson, 1859 - (2033,p186)
Dist: Kodiak to San Clemente Island (2184,p316)
Coll: Central Calif. (2033,p186)
Hab: Intertidal (2033,p186)

Hapalogaster grebnitskii - (2184,p316)
Dist: Bering Sea to Humboldt Bay (2184,p150,316)

Hapalogaster mertensii Brandt
Coll: Puget Sound (2031,p361)

Hemigrapsus nudus (Dana, 1851) - (2033,p185) (3804,p111)
Dist: Sitka, Alaska to Gulf of Calif. (2184,p273)
Coll: B. C.: (3804,p111); Puget Sound: (2031,p365); Central Calif. (2033,p185)
Hab: Intertidal (2033,p185), rocky beaches (3804,p111), are able to stay out of water considerable amount of time (3804,p111)

ARTHROPODA - CRUSTACEA - Decapoda

Hemigrapsus oregonensis (Dana, 1851) - (2033,p185)
Dist: Kodiak, Alaska to Gulf of Calif. (2184,p274,320)
Coll: Puget Sound (2184,p320); Calif: central Calif. (2033,p185)
Hab: Intertidal (2033,p185)
Temp. & Salinity: See (3585)

Hippolyte californiensis Holmes, 1895 - (2033,p185)
Dist: Sitka, Alaska to San Diego, Calif. (2184,p48,312)
Coll: Central Calif. (2033,p185)
Hab: Intertidal (2033,p185)

Hippolyte gracilis Stimpson
Coll: Wash: Puget Sound in deep water (2050,p155)

Hippolyte prionota Stimpson
Coll: Wash: Puget Sound in 8-12 fms (2050,p153)

Hippolyte stylus Stimpson
Coll: Wash: Puget Sound, Straits of Juan de Fuca (2050,p154)

Hippolyte suckleyi Stimpson
Coll: Wash: Puget Sound (2050,p154)
Hab: Dredged in circumlittoral zone (2050,p154)

Hyas lyratus Dana
Coll: Wash: Puget Sound (2031,p371)

Hymenodora frontalis Rathbun - (2341)
Dist: Bering Sea to San Clemente Island (2184,p34,312)
Coll: Oregon (2341)

Hymenodora glacialiss - (2341)
Coll: Oregon (2341)

Hymenodora gracilis Smith - (2341)
Coll: Oregon (2341)

Lopholithodes foraminatus (Stimpson, 1859) - (3003,p10)
Dist: B. C. to San Diego (2184,p157,317)
Coll: Wash: Puget Sound, not a shore form (2031,p383);
Ore: 42m (3003,p10) to 299 fms (2184,p157)

ARTHROPODA - CRUSTACEA - Decapoda

Lopholithodes mandtii - (2184,p317)
Dist: Sitka, Alaska to Monterey Bay (2184,p156,317)

Lophopanopeus bellus (Stimpson, 1860)(1862) - (2033,p185)
Dist: Kodiak to Lower Calif. (2184,p242,319)
Coll: Wash: Puget Sound, buried in sand or mud on rocky shores (2031,p373); central Calif. (2033,p185)
Hab: Intertidal (2033,p185)

Meningodora mollis Smith- (2341)
Coll: Oregon (2341)

Mimulus foliatus Stimpson, 1860 (1862) - (2003,p185)
Dist: Aleutian Islands to Mazatlan, Mexico (2184,p205,318)
Coll: Central Calif. (2033,p185)
Hab: Intertidal (2033,p185)

Mursia gaudichaudii (Milne-Edwards, 1837) - (2003,p185)
Dist: Oregon (3003) to Chile (2184,p191)
Coll: Ore: 100m (3003,p11); Calif: central (2033,p185), Farallon Islands (2184,p318)
Hab: Intertidal (2033,p185)

Nectocrangon californiensis Rathbun, 1902 - (3003,p10)
Dist: Oregon (3003) to Santa Catalina (2184,p315)
Coll: Oregon, 73-119m (3003,p10)

Notostomus japonicus Bate - (2341)
Coll: Oregon (2341)

Oedignathus inermis (Stimpson, 1860) - (2033,p186)
Dist: Aleutians to Monterey Bay (2184,p151,316)
Coll: Puget Sound (2184,p316); central Calif. (2033,p186)
Hab: Intertidal (2033,p186)

Oregonia gracilis - (2184,p318)
Dist: Bering Sea to Monterey Bay (2184,p199,318)
Temp: In San Francisco Bay, 9.8° to 11.0°C (2184,p199)
Salinity: San Francisco Bay, 33.8 to 34.2‰ (2184,p199)

ARTHROPODA - CRUSTACEA - Decapoda

Orthopagurus minimus (Holmes) - (2570,p245) as *Pylopazurus minimus* in (2184,p316)
Dist: B. C. to San Diego (2184,p144)
Coll: Wash: Dredged Friday Harbor region (2570,p245)

Orthopagurus schmitti (Stevens) - (2570,p246)

Pachycheles pubescens Holmes, 1900 - (2033,p186)
Dist: Puget Sound to Monterey Bay (2184,p178,317)
Coll: Central Calif. (2033,p186)
Hab: Intertidal (2033,p186)

Pachycheles rudis Stimpson, 1859 (1860) - (2033,p186)
Dist: Kodiak, Alaska to Lower Calif. (2184,p176,317)
Coll: Central Calif. (2033,p186)
Hab: Intertidal (2033,p186)

Pachygrapsus crassipes Randall, 1839 - (2033,p185)
Dist: Oregon to Gulf of Calif. (2184,p271)
Coll: Central Calif. (2033,p185)
Hab: Intertidal (2033,p185), important predator of limpets; see (3767,p67-8); in biotic succession of *Mytilus californianus* community (2233,p246-9)

Paguristes turgidus (Stimpson, 1957) - (3003,p10) (2184,p315)
Dist: B. C. to San Diego (2184,p123,315)
Coll: Oregon, 40-174m (3003,p10)
Temp: In San Francisco Bay, range 9.3° to 11.1°C (2184,p123)
Salinity: San Francisco Bay, 34.0 to 34.3‰ (2184,p123)

Pagurus beringanus (Benedict)
Dist: Bering Sea to Monterey Bay (2184,p135,316)
Coll: Wash: Puget Sound common on rocky beaches (2031,p357)
Hab: 5-19 fms (2184,p135)

Pagurus capillatus - (2184,p316)
Dist: Arctic Alaska to Monterey Bay (2184,p133,316)
Hab: 2-240 fms (2184,p133)

Pagurus granosimanus (Stimpson, 1859) - (2033,p186) (3804,p112)
Dist: Aleutian Islands to Lower Calif. (2184,p142,316)
Coll: B. C. (3804,p112); central Calif. (2033,p186)
Hab: (2033,p186), tide pools, shallow water along shore (3804,p112), commonly drags around whelk shell (3804,p112), beach to 15 fms (2184,p142)

Pagurus hemphillii (Benedict, 1892) - (2033,p186)
Dist: B. C. to Monterey Bay (2184,p142)
Coll: Central Calif. (2033,p186)
Hab: Intertidal (2033,p186)

Pagurus hirsutuisculus (Dana, 1851) - (2033,p186) (3804,p112)
Dist: Bering Sea to San Diego (2184,p138,316)
Coll: B. C. (3804,p112); Puget Sound (2031,p355); central Calif. (2033,p186)
Hab: Intertidal (2033,p186), conspicuous in tide pools and shallow water along shoreline (3804,p112), to 17 fms (2184,p138)

Pagurus ochotensis Brandt, 1851 - (3003,p10)
Dist: Aleutians to San Diego (2184,p130,316)
Coll: Oregon, 25-640m (3003,p10)

Pagurus samuelis (Stimpson, 1857) - (2033,p186)
Dist: Humbolt County to San Diego (2184,p140,316)
Coll: Central Calif. (2033,p186)
Hab: Intertidal (2033,p186)
Temp: Larvae reared at 17°-18°C (3122,p3)
Misc: Ovulation, embryology and developmental stages (3123)

Pagurus setosus - (2184,p316)
Dist: Sitka, Alaska to Santa Cruz Island (2184,p136,316)
Hab: 50-266 fms (2184,p136)

Pagurus tenuimanus (Dana)
Coll: Puget Sound (2031,p359)

Pandalopsis sp. - (3003,p10)
Coll: Oregon, 46-55m (3003,p10)

ARTHROPODA - CRUSTACEA - Decapoda

Pandalus danae Stimpson, 1857 - (2033,p185)
Dist: Sitka, Alaska to San Francisco (2184,p44,312)
Coll: Puget Sound: young in shallow water, adults deep (2031,p345); Ore: 40-225m (3003); central Calif: (2033,p185)
Hab: Intertidal (2033,p185)
Feeding: Young, dead crabs or other tidbits (2031,p345)

Pandalus jordani Rathbun, 1904 - (3003,p11)
Dist: Aleutians to San Diego (2184,p42)
Coll: Oregon, 100-200m (3003,p11) (2341)
Hab: Live in depths from 40-100 fms on bottoms of green mud or green mud and sand; sometimes leave bottom to spend some time at intermediate depths (2571,p54), 25-199 fms (2184,p42)
Growth: Reared at 13°±0.2°C 43 days from 1st to 8th larvae stage (3346)
Remarks: Important commercially (2571,p54)

See also Chapter 20 p. 288

Pandalus montagui tridens - (2184,p313)
Dist: Bering Sea to San Nicolas Island (2184,p43,313)
Hab: 3-1084 fms (2184,p43)

Pandalus platyceros - (2184,p313)
Dist: Aleutian Islands to San Diego, Calif. (2184,p43,313)
Hab: 25-266 fms (2184,p43)

Paracrangon echinata Dana, 1852 - (3003,p11)
Dist: Kodiak Island to La Jolla (2184,p103,315)
Coll: Oregon, 101-106m (3003,p11)

Parapagurus mertensii - (2184,p316)
Dist: Kodiak, Alaska to San Nicolas Island (2184,p146,316)
Hab: 77-266 fms (2184,p146)

Parapasiphaë cristata Smith - (2341)
Coll: Oregon (2341)

Parapasiphaë sulcatifrons Smith - (2341)
Coll: Oregon (2341)

Paraxanthias taylori (Stimpson, 1860) (1862) - (2033,p185)
Coll: Central Calif. (2033,p185)
Hab: Intertidal (2033,p185)

Pasiphaea chacei Yaldwyn - (2341)
Coll: Oregon (2341)

Pasiphaea pacifica Rathbun - (2341)
Dist: Aleutian Islands to Gulf of Calif. (2184,p29,312)
Coll: Oregon (2341)
Feeding Study: (2563)

Petalidium suspiriosum Burkenroad - (2341)
Coll: Oregon (2341)

Petrolisthes cinctipes (Randall, 1839) - (2033,p186)
Dist: B. C. to Gulf of Calif. (2184,p179,317)
Coll: Puget Sound (2184,p317); central Calif. (2033,p186)
Hab: Intertidal (2033,p186)

Petrolisthes eriomerus Stimpson, 1871 - (2033,p186)
Dist: B. C. to Lower Calif. (2184,p180,317)
Coll: Puget Sound, extreme low tide mark (2031,p363); central Calif. (2033,p186)
Hab: Intertidal (2033,p186)

Petrolisthes manimaculis Glassell, 1945 - (2033,p186)
Coll: Central Calif. (2033,p186)
Hab: Intertidal (2033,p186)

Phyllolithodes papillosus - (2184,p316)
Dist: Aleutian Islands to Monterey Bay (2184,p153,316)

Pinnixa faba (Dana, 1851) - (2033,p185)
Dist: Sitka, Alaska to San Diego (2184,p259,320)
Coll: Central Calif. (2033,p185)
Hab: Intertidal (2033,p185), commensal in bivalves (2184,p259)

Pinnixa littoralis Holmes, 1895 - (2033,p185)
Dist: Sitka, Alaska to San Diego (2184,p260)
Coll: Central Calif. (2033,p185)
Hab: Intertidal (2033,p185)

ARTHROPODA - CRUSTACEA - Decapoda

Pinnixa longipes (Lockington, 1877) - (2033,p185)
Coll: Tomales Bay to Laguna Beach (2184,p258)
Hab: Intertidal (2033,p185)

Pinnixa occidentalis Rathbun, 1893 - (2033,p186)
Dist: Aleutian Islands to Lower Calif. (2184,p262,320)
Coll: Wash: Puget Sound (2184,p320); Calif: central (2033,p186)
Hab: Intertidal (2033,p186)

Pinnixa schmitti - (2184,p321)
Dist: Aleutian Islands to San Francisco (2184,p264,321)
Temp: In San Francisco, annual mean temp. 12.7° to 13.3°
Salinity: 25.3 to 29.6‰ (2184,p265)

Pinnixa tubicola Holmes, 1895 - (2033,p186)
Dist: Washington to San Diego (2184,p266)
Coll: Wash: Puget Sound (2184,p266); Calif: central (2033,p186)
Hab: Intertidal (2033,p186)

Pinnotheres concharum (Rathbun, 1893) - (2033,p186)
Dist: B. C. to San Diego (2184,p253)
Coll: Calif: central (2033,p186)
Hab: Intertidal (2033,p186)

Pugettia gracilis Dana, 1851 - (2033,p186)
Dist: Aleutians to southern Calif. (2184,p206,318)
Coll: Wash: Puget Sound (2031,p367); central Calif. (2033,p186)
Hab: Intertidal (2033,p186)

Pugettia producta (Randall, 1839) - (2033,p186)
Epialtus productus - (2184,p318,202)
Dist: B. C. to Lower Calif.
Coll: Wash: Puget Sound, tide pools and on eel grass (2031,p369); Calif: central (2033,p186)
Hab: Intertidal (2033,p186)

Pugettia richii Dana, 1851 - (2033,p186)
Dist: B. C. to San Diego (2184,p202,318)
Coll: Central Calif. (2033,p186)
Hab: Intertidal (2033,p186)

ARTHROPODA - CRUSTACEA - Decapoda

Pylopagurus minimus (Holmes) - (2184,p316)
See Orthopagurus minimus

Randallia ornata - (2184,p318)
Dist: Mendocino County to Magdalena Bay, Lower Calif. (2184,p189,318)

Rhinolithodes wosnessenskii - (2184,p317)
Dist: Kodiak, Alaska to Crescent City (2184,p158,317)

Rhithropanopeus harrisii (Gould, 1841) - (2033,p186)
Coll: Central Calif. (2033,p186)
Hab: Intertidal (2033,p186)

Scleroplax granulata Rathbun, 1893 - (2033,p186)
Dist: Washington to Lower Calif. (2184,p267)
Coll: Wash: Puget Sound (2184,p267); Calif: central (2033,p186)
Hab: Intertidal (2033,p186)

Scyra acutifrons Dana, 1852 - (2033,p186)
Dist: Kodiak to San Diego (2184,p214,319)
Coll: Wash: Puget Sound (2184,p319); Calif: central (2033,p186)
Hab: Intertidal (2033,p186)

Sergestes similis Hansen - (2341)
Dist: Washington to Gulf of Calif. (2184,p20,312)
Coll: Oregon (2341)
Feeding Study: (2563)

Sergia tenuiremis Krøyer - (2341)
Coll: Oregon (2341)

Spirontocaris bispinosa - (2184,p313)
Dist: Sitka, Alaska to San Diego, Calif. (2184,p54,313)
Hab: 13-211 fms (2184,p54)

Spirontocaris brevirostris Dana
Dist: Alaska to San Francisco Bay (2031,p67,349)
Coll: Wash: Puget Sound, shallow to 150 ft (2031,p349)

ARTHROPODA - CRUSTACEA - Decapoda

Spirontocaris cristata - (2184,p314)
Dist: Sitka, Alaska to San Diego (2184,p69,314)
Hab: 3-33 fms (2184,p69)
Temp: In San Francisco Bay, range 7.6° to 19.4°C, surface temp. 13.8° to 14.6°C (2184,p71)
Salinity: 22.5 to 34.3‰, surface salinity 20.82 to 32.29‰ (2184,p71)

Spirontocaris decora - (2184,p313)
Dist: Straits of Fuca to San Diego, Calif. (2184,p61,313)

Spirontocaris flexa - (2184,p313)
Dist: Bering Sea to Drakes Bay (2184,p59,313)
Hab: 20-93 fms (2184,p59)

Spirontocaris gracilis - (2184,p313)
Dist: Aleutian Islands to Santa Catalina Island (2184,p59,313)
Temp: In San Francisco Bay, bottom temp. range 9.6° to 9.8°C (2184,p60)
Salinity: 34.2 to 34.3‰ (2184,p60)

Spirontocaris kincaidi - (2184,p313)
Dist: Puget Sound to San Pedro (2184,p63,313)
Hab: 21 to 100 fms (2184,p63)

Spirontocaris lamellicornis - (2184,p313)
Dist: Aleutian Islands to Point Arena (2184,p53,313)
Hab: 3-77 fms (2184,p53)

Spirontocaris layi - (2184,p313)
Dist: B. C. to Monterey Bay (2184,p313)

Spirontocaris paludicola (Holmes, 1900) - (2033,p185)
Dist: B. C. to San Diego (2184,p64,313)
Hab: Intertidal (2033,p185)

Spirontocaris prionota (Stimpson, 1864) - (2033,p185)
Dist: Bering Sea to Monterey Bay (2184,p53,313)
Hab: Intertidal (2033,p185)

ARTHROPODA - CRUSTACEA - Decapoda

Spirontocaris snyderi - (2184, p313)
Dist: Puget Sound to Pt. San Eugenio, Lower Calif. (2184, p55, 313)
Hab: Pelagic, 44-77 fms (2184, p55)

Systellaspis braueri (Balss) - (2341)
Coll: Oregon (2341)

Systellaspis cristata (Faxon) - (2341)
Coll: Oregon (2341)

Telmessus cheiragonus (Tilesius)
Dist: Bering Sea to Calif. (probably near northern state boundary) (2184, p235, 319)
Coll: Puget Sound (2031, p381)

Uca musica - (2184, p321)
Dist: B. C. to Gulf of Calif. (2184, p280, 321)

Upogebia pugettensis (Dana, 1852) - (2033, p186)
Dist: Sitka, Alaska to Lower Calif. (2184, p115, 315)
Coll: Puget Sound, burrowing; central Calif. (2033, p186)

Class: INSECTA

Aedes squamiger (Coquillett, 1902)
Coll: San Francisco Bay (2033, p191)
Hab: Salt marshes (2033, p191), brackish coastal marshes (3589, p397)

Anurida granaria (Nicolet) 1847 - (3589, p77)
Dist: Cosmopolitan (3589, p75), seashore (3589, p77)
Coll: California (3589, p77)
Food: Decaying animal or vegetable matter (3589, p75)

ARTHROPODA - INSECTA

Anurida maritima (Guerin, 1836) - (2033, p191)
Dist: Wide; cosmopolitan (3589, p75)
Coll: Central Calif. (3589, p75)
Hab: Intertidal rocks (2033, p191), along seashore in intertidal zone (3589, p77)
Food: Decaying animal or vegetable matter (3589, p75)

Anurida tullbergi Schott 1891 - (3589, p77)
Dist: Cosmopolitan along seashores on rocks and in tidepools (3589, p77)
Coll: California (3589, p77)
Food: Decaying animal or vegetable matter (3589, p77)

Aphrosylus californicus Harmston 1952 - (3589, p454)
Coll: Calif: Orange County (3589, p454)
Hab: Algae-covered intertidal rocks along seacoasts, where adults prey on adults and larvae of midges and other small Diptera or on small annelids (3589, p454)

Aphrosylus direptor Wheeler, 1897 - (2033, p192)
Coll: Calif: Pacific Grove (2033, p192); Humbolt, San Diego (3589, p454)
Hab: Algae-covered intertidal rocks along seacoasts, where adults prey on adults and larvae of midges and other small Diptera or on small annelids (3589, p454)

Aphrosylus grassator Wheeler 1897
Coll: Calif: Pacific Grove (2033, p192) (3589, p454)
Hab: Algae-covered intertidal rocks along seacoasts (3589, p454)

Aphrosylus nigripennis (Van Duzee) 1924 - (3589, p454)
Coll: Calif: Humbolt County (3589, p454)
Hab: Algae-covered intertidal rocks along seacoasts, etc. (3589, p454)

Aphrosylus praedator Wheeler, 1897 - (2033, p192)
Dist: British Columbia to Calif. (2033, p192)
Coll: Calif: Pacific Grove, Point Loma, La Jolla, Humbolt and Monterey Counties (2033, p192) (3589, p454)
Hab: Algae-covered intertidal rocks along seacoasts, etc. (3589, p454)

ARTHROPODA - INSECTA

Aphrosylus wirthi Harmston 1952 - (3589, p454)
Coll: Calif: San Francisco, San Mateo (3589, p454)
Hab: Algae-covered intertidal rocks along seacoasts (3589, p454)

Canaceoides nudata (Cresson, 1926)
Dist: Washington to Los Angeles (2033, p192)
Hab: Intertidal (3589, p475)

Cercyon sp. - (3589, p345)
Coll: California (3589, p345)
Hab: Under kelp and other debris on ocean beaches (3589, p345)
Remarks: May be C. kulzeri Knisch 1922; C. fimfriatus Mannerheim 1852, or C. luniger Mannerheim 1853 (3589, p346)

Corisella decolor - (3589, p190)
Coll: California (3589, p190)
Hab: Saline water (3589, p190)

Corisella inscripta - (3589, p190)
Coll: California (3589, p190)
Hab: Saline water (3589, p190)

Culicoides tristriatulus Hoffman 1925 - (3589, p432)
Dist: Alaska to northern California (3589, p432)
Coll: Calif: Humbolt and Marin Counties (3589, p432)
Hab: Intertidal (3589, p432) (3590, p4)

Diaulota brevipes (Casey, 1894) - (3589) (2033, p193)
Dist: Alaska to Calif. (3589, p348)
Coll: Calif: Moss Beach (2033, p183)

Diaulota densissima Casey, 1893-4 - (2033, p193) (3558, p2)
Dist: Aleutian Island to Calif. (3558, p2) (3589, p348)
Coll: Wash: Willapa Bay (3587, p3); Calif: Moss Beach (2033, p193)
Hab: Intertidal, associated with rocky shore (3587, p3)

ARTHROPODA - INSECTA

Endeodes spp. - (3589, p349)
Dist: British Columbia to Baja Calif. (3589, p349)
Hab: Near high tide mark but definitely in damp areas wet regularly by high tides; found under rubbish, especially boards; ordinarily observed running over rocks and driftwood situated above high tide line, often frequent intertidal area; at times covered by water (3589, p349)

Endeodes blaisdelli Moore, 1954 - (3589; p349)
Dist: British Columbia to Calif. (3589, p349)
Hab: Seashore (3589, p349)

Endeodes collaris (Leconte, 1852) - (2033, p193)
Dist: Pacific coast (2033, p193)
Coll: California (3589, p349)

Endeodes insularis Blackwilder 1932 - (3589, p349)
Dist: British Columbia to Baja Calif. (3589, p349)
Hab: Seashore (3589, p349)

Endeodes rugiceps Blackwelder, 1932 - (2033, p192)
Coll: California (2033, p192) (3589, p349)

Entomobrya laguna Bacon 1914 - (3589, p77)
Coll: California (3589, p77)
Hab: Seashore in intertidal zone (3589, p77)

Eurystethes fuchsi (Horn, 1892) - (2033, p193)
E. fuschsii, 1893 - (3589, p350)
Coll: Mendocino coast and Farallon Islands (2033, p193) (3589, p350)

Eurystethes subopacus Van Dyke, 1918
Coll: Calif: Marin and San Mateo coasts (3589, p350)

Folsomia elongata (MacGillivary) 1896 - (3589, p77)
Coll: California (3589, p77)
Hab: On seashore under rocks in intertidal zone (3589, p77)

ARTHROPODA - INSECTA

Halobisium occidentale Beier - (3587, p3)
Coll: Willapa Bay, Washington (3587, p3)
Hab: Rocky shore, intertidal (3587, p3)

Isotoma besselsii Packard - (3589, p77)
Coll: California (3589, p77)
Hab: Along seashore in intertidal zone under rocks (3589, p77)

Leptoconops kerteszi Kieffer 1908 - (3589, p428)
Coll: California (3589, p428)
Hab: Coastal salt marshes (3589, p348)

Liparocephalus brevipennis Maklin, 1853 - (2033, p193)
Dist: Alaska to Calif. (3588, p1) (3589, p348)
Coll: Calif: Moss Beach (3588, p1)
Hab: Intertidal (3588, p1), rocky shores or areas with compacted shells (3588, p2)

Liparocephalus cordicollis Leconte, 1880 - (2033, p193)
Dist: British Columbia to California (3588, p1)
Coll: Wash: Willapa Bay (3587, p3); Calif: (3588, p1), Moss Beach (3589, p348)

Ochthebius holmbergi Mannerheim 1853 - (3589, p333)
Dist: Pacific coast (3589, p333)

Ochthebius vandykei Knisch, 1924 - (3589, p333) (3590)
Dist: British Columbia to San Luis Obispo, Calif. (3589, p333)
Coll: Calif: San Francisco Bay (3589, p333)
Hab: Intertidal zone along seacoast (3589, p333)

Paraclunio alaskensis (Coquillett, 1900) - (2033, p192)
Dist: Alaska to San Diego (2033, p192) (3591, p179)
Hab: Zone of algae-covered rocks between tide levels on seacoast (3589, p415)

Paraclunio trilobatus Kieffer, 1911 - (2033, p192) (3589, p416)
Dist: Oregon and Calif. (3591, p178)
Coll: Calif: central (2033, p192), Monterey County (3589, p416)
Hab: Zone of algae-covered rocks between tide levels on seacoasts (3589, p415); lives in society of molluscs of the genus *Haliotis* (3591, p178)

ARTHROPODA - INSECTA

Pentacora signoreti - (3589, p225) (3590)
Dist: California (3589, p225), world-wide (3589, p225)
Hab: Salt water shores along coast and at Salton Sea (3589, p225)

Pontomalota californica Casey 1885 - (3589, p348)
Dist: Washington to southern Calif. (3589, p348)
Hab: Intertidal (3589, p348)

Pontomalota luctuosa Casey - (3588, p2)
Dist: Willapa Harbor, Washington to Calif. (3588, p2)
Hab: Intertidal, exposed open sandy beaches fronting upon the ocean (3588, p2)

Proisotoma laguna Folsom - (3589, p77)
Coll: California (3589, p77)
Hab: Intertidal zone along coast (3589, p77)

Salda - (3589, p225) (3590)
Dist: World-wide (3589, p225)
Coll: California (3589, p225)
Hab: Intertidal and along seashore (3590)

Saldula luctuosa - (3589, p225)
Dist: World-wide (3589, p225)
Coll: Salt marsh, San Francisco and Monterey Bays (3589, p225)
Hab: Seashore and intertidal zone (3590)

Telmatogeton macswaini Wirth, 1949 - (2033, p191)
Coll: Calif: Point Cabrillo, Mendocino County (2033, p191) (3589, p416)
Hab: Zone of algae-covered rocks between tide levels on seacoasts (3589, p416)

Tethymyia aptena Wirth 1949 - (2033, p192)
Coll: Central Calif. (2033, p192)
Hab: Zone of algae-covered rocks between tide levels on seacoasts (3589, p415), very common during winter, in early summer species practically disappears, not to reappear until winter rains and cool weather begin in November and December (3591, p165)

ARTHROPODA - INSECTA

Thallasotrechus nigripennis Van Dyke 1918
Coll: Calif: central (2033, p192), Dillon's Beach, Marin County; Moss Beach, San Mateo County; Carmel and Pacific Beach, Monterey County (3589, p300)
Hab: Intertidal (3589, p299) (3590), found by splitting open cracks in rocks (3589, p296)

Thinobius frizzelli Hatch, 1957 - (3587, p1)
Coll: British Columbia; Oakland Bay in Puget Sound; Willapa Bay, Wash. (3587, p1, 9)
Hab: Associated with a growth of blue-green algae Lingyba semiplana (Ag.)
Food: When tide is out, beetles may be seen moving actively about apparently feeding on detritus; when tide is in, they retreat to burrows in interstices of algal growth (3587, p2)
Temp: Midsummer, 60°F, rarely goes above 65°F (3587, p2)

Thinusa maritima Casey, 1885 - (3558, p2)
Dist: Alaska to Calif. (3589, p348)
Coll: Wash: Ilwaco and Ocean Park (3588, p3); Calif: San Francisco, San Diego (3589, p348)
Hab: Intertidal, exposed open sandy beaches fronting upon ocean (3588, p2)

Trichocorixa verticalis (3589, p189)
Coll: California (3589, p189)
Hab: Brackish or saline water (3589, p189)

Trochopus Carpenter, 1898 - (3589, p216) (3590)
Coll: Calif: Tropical American in distribution (3589, p216)
Hab: Marine (3589, p216)

PHYLUM CHAETOGNATHA

Eukrohnia bathypelagica Alvarino - (2341)
Coll: Oregon (2341)

CHAETOGNATHA

Eukrohnia fowleri Ritter-Zahony - (2341)
Coll: Oregon (2341)

Eukrohnia hamata Mobius, 1875 - (2553, p130)
Dist: British Columbia to Oregon (2553, p130) (2341)
Coll: Calif: Cape Mendocino to Trinidad Head (2686) from plankton net hauls; 9/90 successful hauls contained E. hamata (2686, p23)
Remarks: Deep, rare, spring and summer (2553, p130)

Krohnitta subtilis - (2686)
Coll: Calif: Cape Mendocino to Trinidad Head from plankton net hauls; 1/90 successful hauls contained K. subtilis (2686, p23)

Sagitta bierii Alvarino - (2341)
Coll: Oregon (2341); Calif: Cape Mendocino to Trinidad Head (2686) from plankton net hauls; 13/90 successful hauls contained S. bierii (2686, p23)

Sagitta decipiens Fowler - (2341)
Coll: Oregon (2341); Calif: Cape Mendocino to Trinidad Head (2686) from plankton net hauls; 20/90 successful hauls contained S. decipiens (2686, p23)

Sagitta elegans Verrill - (2341)
Coll: Oregon (2341)

Sagitta euneritica Alvarino - (2341)
Coll: Oregon (2341); Calif: Cape Mendocino to Trinidad Head (2686) from plankton net hauls; 86/90 successful hauls, S. euneritica most abundant: 85% worms in study; hauls where S. euneritica not abundant were taken after periods of intense upwellings (2686, p23)

Sagitta macrocephala Fowler - (2341)
Coll: Oregon (2341)

Sagitta minima Grassi - (2341)
Coll: Oregon (2341)

Sagitta scrippsae Alvarino - (2341)
Coll: Oregon (2341); Calif: Cape Mendocino to Trinidad Head (2686) from plankton net hauls; 24/90 successful hauls contained S. scrippsae (2686, p23)

Sagitta zetestios Fowler, 1905 - (2553, pl30)
Dist: British Columbia (2553, pl30) to Oregon (2341)
Coll: B. C.: one speciman recorded from Bute Inlet west coast in summer months (2553, pl30)

PHYLUM MOLLUSCA

Class: AMPHINEURA

Basiliochiton flectens Carpenter - (3090, pl0)
Dist: Vancouver, British Columbia to San Diego, Calif.

Basiliochiton heathii (Pilsbry, 1898) - (2033, p218)
Dist: Sitka, Alaska to San Pedro, Calif.
Coll: Central Calif. coast
Hab: Intertidal (2033, p218)

Callistochiton crassiocostatus Pilsbry, 1892 - (2033)
Dist: Forrester Island, Alaska to San Diego, Calif. (2206, p194) (3090), 32-58°N (5591)

Chaetopleura beanii Carpenter, 1857 - (2550, pl93) (5591)
Dist: Unalaska, Alaska to Mazatlan, Mexico (2250), 23-52°N (5591)

Chaetopleura gemma Carpenter in Pilsbry, 1892 - (2033)(3090)
Dist: Vancouver, British Columbia to Baja, Mexico (3090), 36-54°N (5591)
Coll: Central Calif. coast (2033, p218)
Hab: Intertidal

Chaetopleura thamnopora Berry, 1911 - (2550, pl93)
Dist: Resurrection Bay, Alaska to San Martin Island, Lower Calif. (2550, pl93), 36-48°N (5591)

MOLLUSCA - AMPHINEURA

Chlamydochiton amiculatus Pallas, 1786 - (2550)
Dist: Kuril Islands and northern Japan to Farallones Islands, Calif. (Newcomb) (2550,p197)

Cryptochiton stelleri (Middendorff, 1846)
Dist: Aleutian Islands, Alaska to San Nicolas Island, Calif. (3090), also (2550,p197) (2585,p59) (5591,p38)
Coll: Central Calif. coast (2033,p218)
Hab: Scarce in Monterey area, more common farther north (2033,p218), rock intertidal (2031,p181), granite boulders (2588,p122), low tidal exposures down to 50-60' or more (2585,p59)
Misc: Shell repair (3581)
Repro: (2031,p181)
Excretory & Circ. Systems: (2222,p213)
Food: Prefer thin-fronded algae as Ulva, Monostrema, Iridia (2585,p59)
Commensals: Arctonoe uittata; Opisthopus transversus - in gill chamber (2585,p59), see also (2588)
Temp: Kept in aquarium at 3-6°C - ceased all visible activity (2585,p59)

Cyanoplax dentiens (Gould, 1846) - (2033,p218)
Dist: Alaska to Baja, Calif. (3090,p13) 25-50°N (5591)
Coll: Central Calif. coast (2033)
Hab: Intertidal (2033)

Cyanoplax hartwegii (Carpenter, 1855) - (2033,p218)
Dist: Alaska to Gulf of Calif. (3090,p14)
Coll: Central Calif. coast (2033,p218)
Hab: Intertidal (2033,p218)

Dendrochiton thamnoporus Berry - (3090)
Dist: Alaska to Baja, Calif., Mexico (3090,p14)

Hanleya hanleyi Bean, 1844 - (2550,p187)
Dist: Plover Bay, Bering Strait to Monterey, Calif., Atlantic (2550,p187) (3090,p15), 36-57°N (5591)

Ischnochiton albus Linne - (3090)
Dist: Arctic Ocean to San Diego, Calif. (3090,p16)

MOLLUSCA - AMPHINEURA

Ischnochiton berryi Dall, 1919 - (2033,p218)
Coll: Central Calif. coast, intertidal (2033,p218)

Ischnochiton cooperi (Carpenter in Pilsbry, 1892)- (2033,p218)
Coll: Central Calif. coast (2033,p218)
Hab: Intertidal (2033,p218)

Ischnochiton fallax Carpenter in Pilsbry, 1892 - (2033)
Dist: 28-49°N (5591)
Coll: Central Calif. coast (2033,p218)
Hab: Intertidal, 85 fms (5591)

Ischnochiton heathiana (Berry, 1946) - (2033)
Ischnochiton magdalenensis - (2033)
Coll: Central Calif. coast
Hab: Common under boulders, sometimes even when these are bedded in sand (2033,p218), host to snail Vitrinella oldroydi Bartsch(2033,p218)

Ischnochiton interstinctus Gould, 1846 - (2550,p191)
Dist: Aleutian Islands to Calif.; Sitka, Alaska to Catalina Island, Calif. (3090,p16), 36-57°N (5591)

Ischnochiton mertensii (Middendorff, 1846)
Dist: Sitka, Alaska to San Pedro, Calif. (2550,p192), 34-57°N (5591)
Coll: Central Calif. coast (2033)
Hab: Intertidal

Ischnochiton radians Carpenter in Pilsbry, 1892 - (2033)
Dist: Prince of Wales Island, Alaska to San Pedro, Calif. (2550,p191), 33-58°N (5591)
Coll: Central Calif. coast (2033)
Hab: Intertidal

Ischnochiton retiporosus Carpenter, 1869 - (2550,p191)
Dist: Victoria, British Columbia to San Pedro, Calif. (2550,p191) (3090,p17), 33-53°N (5591)

MOLLUSCA - AMPHINEURA

Katharina tunicata (Wood, 1815) - (2033)
Dist: Alaska to Catalina Island, Calif., 33-57°N (5591)
Coll: Central Calif. coast (2033)
Hab: Exposed mid-tidal ledges, rocks (2031,p175)
Misc: Shell repair (3581)
Food: (2031,p175)

Lepidozona cooperi Dall - (3090)
Dist: Puget Sound, Washington to Catalina Island, Calif. (3090,p21)

Lepidazona golischi Berry, 1919 - (3003,p12)
Dist: Oregon to Catalina Island, Calif. (3090,p21)
Coll: Oregon, 101-106m (3003)

Lepidozona mertensii Middendorff - (3090)
Dist: Sitka, Alaska to Guadalupe Island, Mexico (3090)

Leptochiton internexus Carpenter in Pilsbry - (3090,p24)
Dist: Alaska to San Diego, Calif. (3090)

Leptochiton luridus Dall - (3090)
Dist: Puget Sound, Washington to Panama (3090,p24)

Leptochiton oldroydi Dall - (3090)
Dist: Dall Island, Alaska to San Pedro, Calif. (3090,p26)

Leptochiton rugatus Carpenter in Pilsbry 1892 - (2033)
Coll: Central Calif. coast, intertidal (2033)

Lepidochitona alba Linnaeus, 1767
Dist: Circumboreal, Arctic Ocean to San Diego, Calif. (2550,p188), 32-60°N (5591,p5)

Lepidochitona dentiens Gould, 1846 - (2550)
Coll: Puget Sound, Magdalena Bay, Socorro Island (2550,p188)

Lepidochitona flectens Carpenter, 1864 - (2550,p189)
Dist: Vancouver Island to San Diego, Calif. (2550,p189), 32-49°N (5591)

MOLLUSCA - AMPHINEURA

Lepidochitona hartwegii Carpenter, 1855 - (2550,pl89)
Dist: Forrester Island, Alaska to Gulf of Calif. (2550,pl89), 35-55°N (5591)

Lepidochitona hartwegii nuttalli - (2550)
See L. hartwegii

Lepidochitona lineata Wood, 1815 - (2550,pl88)
Dist: Aleutian Islands to San Diego, Calif. (2550,pl88), Okhotsk Sea, northern Japan (2550,pl88)

Lepidochitona raymondi Pilsbry, 1894 - (2550,pl89)
Dist: Seward, Alaska to San Pedro, Calif. (2550,pl89), 32-60°N (5591)

Lepidochitona ruber Linnaeus, 1767 - (2550,pl88)
Dist: Circumboreal, Arctic Ocean to Monterey, Calif. (2550)

Lepidochitona saccharina Dall, 1878 - (2550,pl88)
Dist: Pribilof, Bering, and Aleutian Islands, in shallow water to San Diego, Calif., in 101 fms (2550)

Lepidochitona submarmorea Middendorff, 1846 - (2550,pl88)
Dist: Aleutian Islands to Puget Sound, Okhotsk Sea and Japan (2550,pl88)

Lepidopleurus cancellatus Sowerby, 1839 - (2550,pl86)
Dist: Bering Strait, Sitka, Alaska to Oregon, Atlantic (2550,pl86), 43-57°N (5591)

Lepidopleurus internexus Carpenter, 1892 - (2550,pl86)
Dist: Belkoffski, Alaska to San Diego, Calif. (2550,pl86), 32-60°N (5591)

Lepidopleurus luridus Dall, 1902 - (2550,pl87)
Dist: Puget Sound (48 fms) to Panama (1,270 fms) (2550,pl87), 8-48°N (5591)

MOLLUSCA - AMPHINEURA

Mopalia ciliata (Sowerby, 1840) - (2033,p219)
Dist: Alaska to Lower Calif. 32-54°N (5591)
Coll: Central Calif. coast (2033,p219)
Hab: Intertidal (2033,p219)

Mopalia ciliata elevata Pilsbry, 1892 - (2550,p195)
Dist: Forrester Island, Alaska to Puget Sound (2550,p195)

Mopalia ciliata wosnessenskii Middendorff, 1847 - (2550,p195)
Dist: Unalaska, Alaska to Santa Rosa Island, Calif. (2550)

Mopalia cirrata Berry
Dist: Dundas Bay, Alaska to San Francisco, Calif. (3090,p27)

Mopalia goniura Dall, 1919
Dist: Granite Cove, Port Althorp, Alaska to Puget Sound (2550,p196), 47-64°N (5591)

Mopalia hindsii (Reeve, 1847) - (2033)
Dist: Alaska to Gulf of Calif. (3090), 33-60°N (5591)
Coll: Central Calif. coast (2033)
Hab: Tolerates silt better than most chitons, and is characteristic of rocks and pilings in bays or estuaries
Misc: Shell repair (3581)
Food: Algae, diatoms, bryozoa, hydroids, barnacles, sponges and molluscs (2579,p79)

Molpalia imporcata Carpenter - (3090)
Dist: Alaska to La Jolla, Calif. (3090,p28)

Mopalia laevior Pilsbry - (3090)
Dist: Alaska to Olympia, Washington (3090,p29)

Mopalia lignosa (Gould, 1846) - (2033,p219)
Dist: Alaska to Baja, Mexico (3090,p29), 23-57°N (5591)
Coll: Central Calif. coast (2033,p219)
Hab: Intertidal (2033,p219)
Food: Algae, diatoms, bryozoa, hydroids, barnacles, sponges and molluscs (2579,p79)

MOLLUSCA - AMPHINEURA

Mopalia muscosa (Gould, 1846) - (2033,p219)
Dist: Shumagin Islands, Alaska to Rosairo, Lower Calif. (2550,p195) (3090)
Coll: Central Calif. coast (2033)
Hab: Intertidal (2033)

Mopalia muscosa hindsii Reeve, 1847 - (2550,p195) (5591,p7)
Dist: Sitka, Alaska to Gulf of Calif. (2550,p195), 32-58°N (5591)

Mopalia muscosa laevior Pilsbry, 1918 - (2550,p195)
Coll: Olympia, Washington (2550,p195)

Mopalia muscosa lignosa Gould, 1846 - (2550,p195)
Dist: Sitka, Alaska to Magdalena Bay, Lower Calif. (2550)

Mopalia swanii Carpenter, 1864 - (3090)
Mopalia mucosa swanii
Dist: Shumagin Islands, Alaska to Malibu, Calif. (3090,p32) (2550,p195)

Mopalia phorminx Berry - (3090)
Dist: Vancouver, British Columbia to Monterey, Calif. (3090,p30)

Mopalia sinuata Carpenter
Dist: Alaska to Monterey, Calif. (3090,p31)

Nuttallina californica (Reeve, 1847) - (2033,p219)
Dist: Straits of Fuca to San Diego, Calif. (2550,p189) (3090,p32), 32-44°N (5591)
Coll: Central Calif. coast (2033,p219)
Hab: This is commonest chiton on exposed coralline and mussel-covered rocks; in soft stone occupies small pits; member of *Mytilus* community (2233,p248)

Placiphorella velata Carpenter in Dall 1878 - (2033,p219)
Dist: Puget Sound, Washington to Baja, Calif. (3090,p34)
Coll: Central Calif. coast (2033,p219)
Hab: Intertidal (2033,p219)

MOLLUSCA - AMPHINEURA

Stenoplax fallax Carpenter, 1892 - (2550,pl90)
Dist: Vancouver Island to Todos Santos Bay, Lower Calif. (3090,p35)

Stenoplax magdalenensis Hinds, 1843 - (2550,pl90)
Dist: Coos Bay, Oregon to Magdalena Bay, Lower Calif. (2550)

Tonicella lineata (Wood, 1815) - (2033)
Dist: Aleutian Islands to San Diego, Calif. (3090,p37), 32-56°N (5591)
Coll: Central Calif. coast (2033,p219)
Hab: Abundant on coralline-encrusted, shaded rocks, well camouflaged by its color and broken pattern (2033,p219)
Food: Algae, diatoms, bryozoa, hydroids, barnacles, sponges and molluscs (2579,p79)

Tonicella saccharina Dall - (3090)
Dist: Alaska to San Diego, Calif. (3090,p37)

Class: SCAPHOPODA

Cadulus californicus (Pilsbry and Sharp, 1898) - (3003,pl3)
Dist: Alaska to Ecuador (2026,pl6), -1 to 56°N (2551)
Coll: Oregon (3003,pl3)

Cadulus hepburni - (2551)
Dist: British Columbia to Monterey, Calif. (2026,pl5), 37-61°N (2551)

Cadulus tolmiei - (2551)
Dist: British Columbia to Lower Calif. (2026,pl6), 30-49°N (2551)

Dentalium inversum - (2551)
Dist: Bering Sea to Panama (2026,p9), 8-58°N (2551)

Dentalium pretiosum (Sowerby, 1860) - (3003,pl3) (Indian tooth shell)
Dist: Alaska to San Diego, Calif. (2026,pl4)
Coll: Oregon (3003,pl3)
Hab: Buried, subtidal (2031,p231)

MOLLUSCA - SCAPHOPODA

Dentalium rectius (Carpenter, 1864) - (3003,pl3)
Dist: Alaska to Panama (2026,pl2), 8-56°N (2551)
Coll: Wash: Puget Sound (2026,pl2); Oregon (3003,pl3)

Dentalium vallicolens - (2551)
Dist: Washington to Gulf of Calif. (2026,pl3), 23-28°N (2551)

Class: PELECYPODA
Family: Nuculidae

Acilia castrensis Hinds, 1843 - (3003,pl4)
Dist: Bering Sea to San Diego, Calif. (2009,pl4), 28-64°N (5591), 30-64°N (2551)
Coll: Oregon, 64-100m (3003), 30-300 fms (5591,p9)

Nucula carlottensis Dall, 1897 - (2551)
Dist: British Columbia to southern Calif. (2209,pl3), 34-54°N (2551) (5591)

Nucula linki Dall, 1916 - (2551)
Dist: British Columbia to Mexico (2209,pl2), 23-55°N (2551) (5591)

Nucula tenuis Montagu 1808 - (2551)
Dist: Pt. Barrow, Alaska to southern Calif. (2209,pl2), 32-73°N (2551) (5591)

Family: Nuculanidae

Nuculana acuta Conrad 1831 - (2551)
Dist: Aleutians to Gulf of Calif. (2209,pl6), 21-52°N (2551) (5591)

Nuculana austini (Oldroyd) - (2551)
Dist: 48-49°N (5591), 49°N (2551)

MOLLUSCA - PELECYPODA - Nuculanidae

Nuculana cellulita Dall 1896 - (2551)
Dist: 48-55°N (5591)
Coll: Wash: Puget Sound (2209,p17)

Nuculana conceptionis (Dall, 1896) - (2551)
Dist: 33-56°N (5591) (2551)

Nuculana hamata Carpenter, 1869 - (2551)
Dist: Puget Sound to Panama Bay (2209,p24), 8-48°N (2251) (5591)

Nuculana leonina (Dall, 1896) - (2551)
Dist: Juna de Fuca, Washington to 36°N (2209,p21), 36-55°N (5591), 36-58°N (2551)
Coll: 10-1100 fms (5591)

Nuculana minuta (Fabricus, 1776) - (2551)
Dist: Arctic Ocean to San Diego, Calif. (2209,p15), 33-72°N (2551) (5591)
Coll: 20-200 fms (5591)

Nuculana penderi (Dall, 1910) - (2551)
Dist: British Columbia to Santa Barbara, Calif. (2209,p18), 34-60°N, 10-100 fms (5591)

Yoldia amygdalae Valenciennes, 1846 - (2584,p58)
Dist: South of Bering Sea to northern Calif. (2584,p58)
Coll: Georgia Strait off San Juan Island; Cape Mendocino and others (2584,p58)
Hab: Mud bottoms to depths of ± 100 fms
Food: Important in benthic food chains. Found in stomachs of bottom feeding fishes (2584,p58)

Yoldia cecinella Dall, 1916 - (2551)
Dist: Aleutian Islands to Gulf of Calif. (2209,p34), 23-55°N, 10-50 fms (2551) (5591)

Yoldia ensifera Dall, 1897 - (2551)
Dist: Alaska to San Diego, Calif. (2209,p34), 36-56°N, 10-250 fms (2551) (5591)

Yoldia gardneri Oldroyd, 1935
See also Y. amygdalae, Y. limatula
Dist: 49°N (2551)
Coll: B.C.: Pender Harbour, 4 fms (5591)

Yoldia limatula Say 1831
Yoldia limatula gardneri (Oldroyd, 1935)
Dist: Arctic Ocean to San Diego, Calif. (2209,p31), 33-72°N (2551), 15-30 fms (5591)
Coll: Oregon, 118-1829m (3003,p14)

Yoldia martyria Dall 1897 - (2551)
Dist: Alaska to Gulf of Calif. (2209,p29), 23-55 °N, 120 fms (2551)

Yoldia montereyensis - (2551)
Dist: Alaska to San Diego, Calif. (2209,p29), 33-56 °N, 100 fms (2551) (5591)

Yoldia myalis (Couthouy 1838)
Dist: 48-72 °N, Arctic Ocean to Puget Sound (2209,p30)
Hab: Subtidal, 50 fms (2551) (5591)

Yoldia orcia Dall, 1916
Dist: Tillamook Bay, Oregon to San Diego, Calif. (2209,p34), 33-46° N (2551)

Yoldia sanesia Dall 1916
Dist: Alaska to Pt. Conception, Calif. (2209,p34), 34-55 °N (2551) (5591)

Yoldia scissurata Dall 1897 - (2551)
Dist: Arctic Ocean to Puget Sound (2209,p31), 48-72° N, 10-200 fms (2551) (5591)

Yoldia thraciaeformis (Storer, 1838)
Dist: Arctic to Oregon (2209,p27), 44-72 °N, 20-200 fms (2551) (5591)

Yoldia vancouverensis Smith, 1880
Dist: 49-50 °N (2551), 40 fms (5591)

Family: Glycymerididae

Glycymeris corteziana Dall, 1916
Dist: Alaska to Cortez Bank, Calif. (2209,p42), 33-55 °N, 10-60 fms (2251) (5591)

Glycymeris migueliana Dall, 1916
Dist: Cape Blanco, Oregon to Lower Calif. (2209,p43), 25-55 °N (2551) (5591)

Glycymeris subobsoleta Carpenter, 1864
Dist: Aleutians to Cortez Bank, Calif. (2209,p42), 48-56 °N (2551), 33-56 °N, 1-35 fms (5591)

Family: Philobryidae

Philobrya setosa Carpenter 1872 - (2551)
Dist: Alaska to Gulf of Calif. (2209,p50), 23-55°N (2551) (5591)
Hab: Intertidal, 10 fms (5591)

Family: Mytilidae

Botula californiensis (Philippi, 1847)
Dist: 32-54°N (5591)
Coll: Ore: abundant at Nelscott, Alsea Bay, other points (2344,p2); central Calif. coast
Hab: Intertidal

Botula diegensis Dall 1911
Dist: 23-48°N (2551) (5591)
Hab: Intertidal

Botula falcata (Gould, 1851) - (2033,p235)
Dist: Oregon to California
Coll: Ore: Coos Bay, Yaquina reef, dredged, Boiler Bay, Yaquina Bay (3623); Calif: central coast, Cape San Lucas, Baja Calif. (2227,p51)
Hab: In rocks in burrows of pholads (2227,p51), along coast where soft clay, shale, rocks
Temp. &Salinity: Faster development rate and greatest number of normal individuals occur at salinity of 33.2‰ and temp. of 15°C. Development ceased at 5°C and 20°C. Spawning season unknown (3623)

Crenella columbiana Dall 1897 - (2551)
Dist: Aleutians to San Diego, Calif. (2209,p80), 33-55°N (2551) (5591)

Crenella decussata (Montagu 1808)
Dist: Bering Sea to San Diego, Calif. (2209,p79), 33-60°N (5591) (2551), 5-50 fms

Modiolaria corrugata (Stimpson 1851)
Dist: 48-72°N, 5-20 fms (2551) (5591)

Modiolaria nigra (Gray 1824)
Dist: Arctic Ocean to Oregon (2209,p74), 44-72°N (2551) (5591)
Hab: Intertidal, 50 fms

MOLLUSCA - PELECYPODA - Mytilidae

Modiolaria obesa - (2551)
May = nigra
Dist: 48-72 °N (2551)

Modiolaria olivacea Dall, 1916 - (2551)
Dist: Bering Sea to Catalina Is., Calif. (2209,p75), 34-60°N (2551), 10-100 fms (5591)

Modiolaria protracta Dall, 1916
Dist: Bering Sea to Monterey (2209,p75), 37-60°N (2551), 2-10 fms (5591)

Modiolaria substriata (Gray, 1824) - (2551)
Dist: Arctic Ocean to Puget Sound (2209,p77), 48-72°N (2551) (5591)
Hab: Subtidal, 80 fms

Modiolaria taylori Dall, 1897 - (2551)
Dist: 48-54°N (5591), 49°N (2551)
Hab: Intertidal, 5 fms

Modiolus flabellatus (Gould, 1850) - (2551)
Volsella flabellata (Gould 1850) - (2227,p49)
Dist: Vancouver Island, B.C. to San Diego Bay, Calif. (2227,p49), 33-49°N (2551)
Hab: Muddy bays, lagoons, and more quiet offshore waters. Lives entirely in mud with posterior shell tips only above mud (2227,p49)

Modiolus fornicatus Carpenter, 1865
Dist: 32-48°N, 32-52°N (2551), 10-80 fms (5591)

Modiolus modiolus Linnaeus 1758
Dist: Alaska to San Pedro (3814,p220) (2209,p68), 27-72°N (2551) (5591)
Hab: Solitary species; partly buried in sandy mud or gravel (3814,p220), 2-60 fms; deep water kelp holdfasts (2031,p199)
Econ: Edible but not abundant (3814)
Feeding: (2031,p199)

Modiolus rectus Conrad, 1837 - (2033,p236) (3804,p119)
Dist: B. C. to Lower Calif. (3814) (3804)
Hab: Intertidal, grows solitary in sand, gravel, or mud (3804,p119) (3814,p220)
Description: (3814)
Econ: Edible but not abundant

MOLLUSCA - PELECYPODA - Mytilidae

Mytilus trossulus Gould, 1850 - (2251)
Dist: 37-48°N (2551)

Mytilus californianus Conrad, 1837 - (2031) (2033) (2227) (3753) (2236)
Dist: Aleutian Islands to Socorro Island, Mexico (2209, p66)
Coll: B.C.; Ore: Ecola Pt. (2344) (2345), Tillamook, Cannon Beach; central Calif. coast (2033)
Hab: Intertidal; pounding surf, exposed coast; attached to rocks; ecological succession of habitat in Monterey Bay. On Oregon coast at almost every point rocks large enough to gain foothold; open coast, below tideline.
Remarks: See Volume I for an intensive literature survey on this species.

Mytilus edulis Linnaeus, 1758
Dist: Cosmopolitan; Arctic Ocean to Baja Calif. (2224, p219), 28-74°N (2551) (5591) (2227, p53)
Coll: B. C.: (3804, p119); Ore: (2344) (2345), Sunset Bay, Tillamook Head Sound in protected bays (2345, p188); central Calif. coast (2033, p236)
Hab: Prefers quiet water, found there attached to rocks, boulders, piles and floats; masses below half tide (3804, p118); intertidal (2033, p236); 5 fms (2209, p66); pilings, rocks, splash zone (2031, p195); rocky shores, mud-bottomed bays, predominates in quiet waters (3753, p48); also (2224, p219) (2227, p53)
Description & Photo: (3804, p118); (2224, p219) (2227, p53)
Population Dynamics: (3750, p198)
Economics: Edible (3804, p119), cultivated in Europe for food, here as fish bait, seldom eaten (2227, p53)
Habits: Crawling-out behavior (1) adaptation to physical environment (2) facilitates distribution (3) gives initial competitive advantage over other mussels (3753, p48)
Temp: Susvival of sp. under reduced O_2 and chlorinity at 15-16°C in lab (3810, p384); calcification rate varies directly with temp. and salinity thresholds found; at 32‰ salinity calcification occurred between 5-23.5°C; at 18.5°C, calcification proceeded from 20-37‰ salinity (2702, p432); evidence indicates spawning related to water temp.; specimens in protected bays spawn earlier than those more exposed to colder waters (2345, p199)

See also Chapter 20
p. 273

Septifer bifurcatus (Conrad, 1837) - (2033,p236)
Dist: Crescent City, Calif. to Gulf of Calif. (2209,p67), 23-42°N (2551)
Coll: Central Calif. coast (2033,p236)
Hab: Intertidal

Volsella - see *Modiolus* (*Volsella* suppressed by ICZN, 1955 No. 791)

Family: Ostreidae

The various species of *Ostrea* and *Crassostrea* are generally bay and estuarine forms, but are included herein because they occasionally occur along the open coastline. The oyster literature has not been searched rigorously.

Crassostrea gigas (Thunberg, 1795) Pacific Oyster (3804,p122)(2227,p39)
Ostrea gigas
Dist: British Columbia (3804,p122) to Morro Bay, Calif.
Coll: B. C.: Vancouver Island; Wash: Puget Sound
Hab: Intertidal
Feeding: (2031,p185)
Reproduction: (2031,p195)
Misc: Imported from Japan as "seed" oysters; some natural spawning (3804,p123)

Crassostrea virginica (Gmelin 1791) - (2227,p40) (5591)
Dist: British Columbia to Morro Bay, Calif. (2227,p40)
Remarks: Introduced in San Francisco Bay

Ostrea lurida Carpenter, 1864
Dist: Sitka, Alaska to Cape San Lucas, Baja Calif. (2209,p50)
Coll: Wash: Puget Sound (2031); Oregon (3813,p18); central Calif. coast (2033)
Hab: Intertidal; inlets and bays "attached to shells of previous generations or any firm surface which will hold them out of the mud;" natural bed: 6 oysters to acres; found "between channel bottoms and on mud flats at about three-foot tide level."

Ostrea laticuadata Carpenter, 1864
Dist: 23-48°N (2551)

MOLLUSCA - PELECYPODA - Pectinidae

Family: Pectinidae

Chlamys hericius (Gould, 1850) - (5591) (2551) (2031)
Chlamys hastatus hericius - (3003,p13)
Pecten hericius - (2033,p236)
Dist: Alaska to San Diego (2552,p364), 42-58°N (5591) (2209,p52)
Coll: Wash: Puget Sound (2031); Ore: 46m; central Calif. coast
Hab: Dredged in shallow water; the pectens listed here are common farther north; several other species are about equally common in Monterey Bay, all subtidal and seldom seen (2033,p236)

Chlamys hindsii (Carpenter, 1864) - (3003,p113)
Chlamys hindsi
Dist: Bering Sea to San Diego, Calif. (2209,p53), 34-55°N, 34-60°N (2551) (5591)
Coll: Oregon, 46m; central Calif. coast
Hab: Intertidal (2033), subtidal (2031)

Hinnites giganteus Gray, 1825 - (2224,p216) (3814,p216)
Dist: Alaska to Lower Calif. (2224,p216) (2209,p63)
Hab: "Attached to rocks and shells below high tide line on the outer coast in somewhat sheltered places" (2224)
Description: (2224)
Econ: Used locally for food (2224)

Hinnites multirugosus (Gale, 1928) - (2033) (2551) (2227) (2031)
Dist: Queen Charlotte Island, B. C. to Abreojos Point, Baja Calif. (2227,p41)
Coll: Central Calif. coast (2033,p236)
Hab: Intertidal (2033,p236); young are free swimming, adults attached (2031,p121); below high tide line on outer coast in somewhat sheltered places over 100'; in northern Calif. shallower than southern Calif. (2227,p41)
Econ: Large adductor muscle all used (2227,p41), one of finest
Life Cycle: Swims; when slightly over an inch in diameter, becomes permanently attached to a suitable rock or other stationary object (2227,p41)

Pecten caurinus Gould, 1840 - (3003) (2552) (5591) (2227,p44)
Patinopecten caurinus (Gould, 1850)
Dist: Alaska to Humbolt Bay, Calif.
Coll: Ore: 119m (3003), Siletz Bay (2209,p57), 25-65 fms (3408); Calif: Eureka (2552,p316), 41-57°N, 6-90 fms (5591), Humboldt Bay (2552)

Pecten vancouverense
Pseudamusium vancouverense Whiteanes, 1893 - (2551)
Dist: Bering Sea to San Diego (2209,p60), 33-58°N (2551)

Propeamussium alaskense, Dall 1871
Pseudamusium alaskense
Dist: 34-56°N, 50-200 fms (5591,p43)

Family: Anomiidae

Pododesmus cepio (Gray 1849) - (2227,p45)
Dist: British Columbia to San Quintin Bay, Baja Calif. (2227)
Hab: "Live singly or attached to rocks... most frequently observed on shells of living abalones;" most often on *Haliotis rufescens* (2227,p45)
Misc: Edible (2224)

Pododesmus macroschisma (Deshayes, 1839) - (2033,p235) (3814,p217) (2031)
Dist: Alaska to Lower Calif. (2224,p217), 30-57°N (2551) (5591) (2209,p65)
Coll: Central Calif. coast
Hab: Intertidal
Misc: Edible (2227)

Family: Chamidae

Chama pellucida (Broderip 1834) - (2033,p236); (Sowerby, 1835 - (2227,p58)
Dist: Oregon to Chile (2227,p58), 6°S to 44°N (2551,p19) (2209,p118)
Coll: Central Calif. coast
Hab: Intertidal; open coast, seldom in quiet waters; attached to rocks, planks, and other solid objects (2227,p58)
Misc: Edible

MOLLUSCA - PELECYPODA - Chamidae

Pseudochama exogyra (Conrad, 1837) - (2033,p236)
Dist: 8-45°N (2551), 8-53°N (5591), Oregon to Panama (2227,p59)
Coll: Central Calif. coast (2033,p236)
Hab: Intertidal (2033,p236), open coast attached to solid objects (2227,p59)
Description & Photo: (2227,p58)
Use: Excellent flavor but not used because small amount of flesh and difficult to remove flesh (2227,p59)

Family: Asteridae

Astarte compacta Carpenter 1864
Dist: Alaska to Puget Sound (2209,pl04), 48-57°N (2551) 10-70 fms (5591)

Astarte esquimalti Baird 1863 - (2551)
Dist: Alaska to Puget Sound (2209,pl08), 48-60°N (5591)

Family: Carditidae

Cardita alaskana (Dall 1903) - (2551)
Dist: 62°N (2551)

Cardita crebricostata Krause, 1885 - (2551)
Dist: Alaska to central Calif. (2209,pl14), 37-72°N (2551) (5591)
Hab: Intertidal to 20 fms

Cardita paucicostata Krause 1885 - (2551)
Dist: Arctic Ocean to Washington (2209,pl13), 48-72°N (2551) (5591)

Cardita prolongata Carpenter 1864 - (2551)
Dist: Alaska to San Diego, Calif. (2209,pl15), 33-59°N (2551) (5591)

MOLLUSCA - PELECYPODA - Carditidae

Cardita stearnsii Dall 1902 - (2551)
Dist: Puget Sound (2209,pl12), 48°N (2551)

Cardita ventricosa (Gould, 1850) - (2551)
Venericardia ventricosa - (3003,pl4)
Dist: 32-55°N, 10-100 fms (2551), Alaska to San Diego, Calif. (2209,pl14), 32-57°N
Coll: Oregon, 118-512m (3003,pl4)

Glans carpenteri (Lamy, 1922) - (2551)
Dist: 32-55°N (5591) (2551)
Hab: Intertidal to 80 fms (5591)

Family: Erycinidae

Lasaea subviridis Dall, 1899 - (2551)
Dist: 30-40°N (2551)
Coll: Ore: Seal Rock to Salmon River
Hab: Upper intertidal on rock faces; associated with M. californianus beds (2061)
Misc: Ecology and behavior (2061)

Family: Kelliidae

Bornia retifera Dall, 1899 - (5591,pl2)
Dist: 34-50°N (5591)
Hab: Intertidal, 10 fms

Kellia cistula (Keen, 1938)
Lasaea cistula - (2033,p237)
Dist: 30-54°N (5591,p23)
Coll: Central Calif. coast
Hab: Intertidal, 8-10 fms

Kellia laperousii (Deshayes, 1839) - (2033)
Dist: Bering Sea to San Diego, Calif. (2209,pl31), 20-60°N (2551)
Coll: Central Calif. coast (2033,p237)
Hab: Intertidal (2033,p237)

Kellia rubra Montagu 1804 - (5591)
Dist: 8-56°N (2551), 12-54°N (5591)
Coll: Central Calif. coast
Hab: Intertidal

Family: Leptonidae

Chironia suborbicularis (Montagu, 1804) - (5591,pl5)
Dist: Aleutians to Panama (2209,pl31), 8-60°N, 10-150 fms (5591)

Chironia meroeum (Carpenter, 1864)
Lepton meroeum - (2551)
Dist: 33-48°N (2551)

Family: Montacutidae

Mysella aleutica (Dall, 1899)
Rochefortia aleutica - (2551)
Dist: Bering Sea to Lower Calif. (2209,pl34), 32-60°N (2551)

Mysella compressa (Dall, 1913)
Rochefortia compressa - (2551)
Dist: Alaska to Gulf of Calif. (2209,pl34), 23-55°N (2551)

Mysella tumida (Carpenter, 1864)
Rochefortia tumida - (2551)
Dist: Alaska to San Diego (2209,pl32), 28-55°N (5591)
Coll: Calif: Tomales Bay (2578,p72)
Hab: Size negatively associated with sediment size (i.e., not turbidity sensitive) (2578), 10-40 fms (5591)
Food: Copepods, diatoms (2578)

Pseudopythina compressa Dall, 1899
Dist: Arctic Ocean to Aculpulco, Mexico (2209,pl36), 16-70°N (2551)

Pseudopythina myaciformis Dall, 1916 - (2551)
Dist: Puget Sound (2209, pl36), 48°N (2551)

Pseudopythina rugifera (Carpenter, 1864) - (2033, p237)
Dist: Alaska to Lower Calif., 37-48°N (2582, p43)
Coll: Central Calif. coast (2033)
Hab: Ciliary mechanism of ctenida suggests it lives in silt or muddy substrate; lives attached to ventral surface of Aphrodita or Upogebia (2582, p49)
Food: Large size of stomach and style sac is adaptive for ingestion of large quantities of bottom material (2582, p51)
Repro: Female specimens taken in April had gills filled with developing embryos (2582, p49)

Family: Vesicomyacidae

Calyptogena pacifica Dall, 1891 - (2551)
Dist: Alaska to southern Calif. (2209, pl16), 34-56°N (2551)

Vesicomya lepta Dall, 1896 - (2551)
Dist: Off Tillamook, Oregon to Gulf of Calif. (2209, pl47), 23-45°N (2551)

Vesicomya ovalis Dall, 1895 - (2551)
Dist: Alaska to Panama (2209, pl48), 8-56°N (2551)

Family: Turtoniidae

Turtonia minuta (Fabricius, 1780) - (5591)
Dist: Bering Sea to Lower Calif. (2209, pl39), 25-63°N (5591)

Family: Lucinidae

Lucinoma annulata (Reeve, 1850)
Lucina annulata - (2551)
Dist: Alaska to Lower Calif. (2209, pl26), 32-58°N (2551)

Lucinoma californica (Conrad, 1837)
Lucina californica - (2551)
Dist: Crescent City, Calif. to Lower Calif. (2209,pl27)
27-42°N (2551)

Lucinoma densilirata (Dall, 1919) - (2551)
Dist: Alaska to southern Calif. (2209,pl27), 35-57°N (2551)

Lucinoma tenuisculpta (Carpenter, 1864) - (2551)
Dist: Bering Sea to Lower Calif. (2209,pl28), 32-60°N (2551)

Family: Thyasiridae

Axinopsida serricatus (Carpenter, 1864)
Axinopsis serricatus - (2551)
Dist: Aleutians to Catalina Island (2209,pl23), 34-56° N (2551)

Axinopsida viridis (Dall, 1901)
Axinopsis viridis - (2551)
Dist: Arctic Ocean to Lower Calif. (2209,pl23), 32-72°N (2551)

Thyasira barbarensis Dall, 1889 - (2551)
Dist: Straits of Juan de Fuca to Lower Calif. (2209,pl20),
23-48°N (2551)

Thyasira disjuncta (Gabb, 1869) - (2551)
Dist: 44-56°N (2551)
Remarks: Probably a fossil species may be a synonym of
T. bisecta (5591,p 51)

Thyasira excavata Dall, 1901 - (2551)
Dist: Oregon to Gulf of Calif. (2209,pl22), 23-45°N (2551)

Thyasira gouldii Philippi, 1845 - (2551)
Dist: Bering Straits to San Diego (2209,pl21), 33-64° N (2551)

Thyasira polygona Jeffreys, 1863 - (2551)
Dist: Gulf of Alaska to San Diego (2209,pl21), 33-61°N (2551)

Thyasira trisinuata Orbingy, 1846
Dist: Alaska to San Diego (2209,p121), 33-57°N (2551)

Family: Diplodonidae, See Ungulinidae

Family: Ungulinidae

Taras orbella (Gould, 1852)
Diplodonta orbella Gould, 1852
Dist: Pribiloff Islands to Gulf of Calif. (2209,p124), 23-57°N
Hab: Intertidal to 100 fms

Family: Cardiidae

Clinocardium blandum (Gould, 1850) - (2551)
Dist: 48°N (2551)

Clinocardium ciliatum (Fabricius 1780) - (2551)
Dist: 48-72°N (2551)

Clinocardium fucanum (Dall, 1907) - (2551)
Dist: 37-57°N (2551)

Clinocardium nuttalli (Conrad, 1837) - (2551) (2571,p57)
Basket cockle, quahog (2227,p57), Heart cockle (3814,p221)
Cockle (3804,p125)
Dist: 33-60°N (2551), Bering Sea to San Diego (2552,p403) (2227,p57), Puget Sound to Mexico (3814,p221)
Coll: B. C.: (3804,p125); Ore: (3813,p10), 46m (3003,p13), Tillamook, Yaquina, Netarts, Coos Bays and others (2345,p187), dredged in 5-12 1/2 fms off Coos Bay to Newport, reported to be common off Umpqua, 10-15 fms (3412)
Hab: Tide flats in inlets and bays, also beaches (3814,p221); sandy beaches buried beneath sand between tide marks (2031,p201), intertidal (2033,p237); found in bays

Clinocardium nuttalli (Conrad, 1837) - continued
Hab: continued (2571,p57) (2345,p187); often found exposed on tide-flats among eel grass (3804,p125); commonly associated with *Schizothaerus nuttalli* and *Paphya*
Habits: Active diggers, but short siphons do not allow them to burrow to great depths (3814,p221); lives on mud surface, or just below (2227,p57)
Repro: Hermaphroditic--late fall and winter sexes hard to determine, sex elements begin to appear in spring, spawning from middle to latter part of September; October to March reproductive organs pass through phases of of reorganization (2345,p197)
Econ: While it is not abundant, it is considered to be excellent food (3804,p125); highly esteemed for food (2227,p57)

Nemocardium centrifilosum (Carpenter, 1863) - (3003,p14)
Dist: Alaska to Lower Calif. (2209,p146) (2552,p399), 30-38°N (2551)
Coll: Oregon, 101-106m (3003,p14)

Nemocardium richardsoni Whiteaves, 1878) - (2551)
Dist: British Columbia to San Francisco (2209,p147), 38-55°N (2551)

Serripes groenlandicus (Bruguiere, 1789) - (2551)
Dist: Arctic to Puget Sound (2209,p145), 48-72°N (2551)

Family: Veneridae

Compsomyax subdiaphana (Carpenter, 1864) - (2551)
Dist: Alaska to San Pedro, Calif. (2209,p156), 34-56°N (2551)

Mercenaria kennicottii (Dall, 1871)
Venus kennicottii Dall, 1871 - (2551)
Dist: Neah Bay, Washington to Mendocino, Calif. (2209,p155), 40-48°N (2551,p54)
Hab: Intertidal

MOLLUSCA - PELECYPODA - Veneridae

Venus mercenaria Linnaeus 1758 - (2227,p61)
Mercenaria mercenaria

Dist: British Columbia to Humboldt Bay, Calif. (2227,p61)

Hab: Beneath surface in sand or sandy mud in intertidal zone of bay (2227,p61)

History: Possible introduction from Atlantic stock shipment, may be supposed native species *Venus kennicotti* (Dall 1871) (2227,p61)

Econ: Highly esteemed for food on Atlantic Coast: heavy sport and commercial fishery there. Shipped to Calif; used as wampum by Indians in early days (2227,p61)

Salinity: (3629)

Protothaca staminea
Paphia staminea Conrad

Dist: Alaska to Mexico (3814,p225) (2209,p157), 23-73°N (2551)

Coll: B. C.: (3804,p120), along coast of Strait of Juan de Fuca (2730,p234); Wash: northwest coast (2345,p184); Ore: in larger bays as Tillamook, Netarts, Yaquina, Coos (2345,p184), 70-80m (3003,p14), (3813,p13); Calif: central coast (2033,p237)

Hab: Intertidal (2033,p237), bays (2571,p57), gravel-mud beds (3813,p13), beaches of coarse sand or fine gravel, low intertidal (2231,p254), coarse, sandy mud of bays, sloughs, and estuaries--2"-3" below surface; on open coast on rocky points or reef of small cobbles with a coarse sand underneath (2227, p66), sandy beaches and on gravel bars and reefs near entrances of bays and inlets (3814,p225)

Population Dynamics: (3750,p193)

Predators: *Forreria belcheri*, *Shaskyus festivus* (3750,p197)

Food: Suspension feeder (3740,p196)

Growth: Most rapid on beaches exposed to strong tidal currents where food supply adequate and constant (2231,p265)

Repro: Spawning both spring and late summer (2345,p195); half spawn at end of 2nd year when 25 mm, half spawn at end of 3rd year when 35 mm (2231,p267), spawn February and March in Strait of Georgia (2231,p268)

Protothaca staminea - continued

Econ: Commercially important (2571,p57), harvested commercially for fresh market (3804,p121), highly esteemed for food--sought by Calif. sport and commercial diggers (2227,p66)

Temp: Tolerance to high temp. or rapid temp. change; little known (2730,p247)

Note: Dredging of Yaquina Bay largely destroyed clam (2345, p184)

Psephidia lordi Baird, 1863 - (2551)

Dist: Alaska to Lower Calif. (2209,p161), 33-55°N (2551)

Psephidia ovalis Dall, 1902 - (2551)

Dist: Bering Sea to San Diego (2209,p161), 33-57°N (2551)

Saxidomus brevis - (2551)

Dist: Alaska to Tacoma (2209,p153), 47-58°N (2551)

Note: The northern species should be S. giganteus, those south of 45° S. brevis (5591,p45)

Saxidomus giganteus Deshays 1839 - (5591)

Subspecies of S. nuttalli (5591,p46)

Dist: Aleutian Islands to Monterey, Calif. (2209,p153) (3814,p223), 37-56°N (2551)

Coll: B. C.: (3804,p119); Puget Sound: (2031,p203), along coast of Strait of Juan de Fuca (2730,p234); Ore: (3813,p12);

Hab: 8-10 inches in mud flats of all bays and inlets (3814,p223); characteristic of ocean beaches or sand and gravel beds of bays with direct circulation from ocean (2345,p186); 10-14" in mud or sandy mud of bays, estuaries, lagoons in areas usually exposed at low tide (2227,p63); 6-12" beneath surface of gravel-mud beds, Oregon has few beds due to lack of suitable habitat (3813,p12); growth more rapid where exposed to strong tidal currents (2232,p277)

Econ: Important in Netarts Bay, Yaquina Bay, Sunset Bay (2345,p186); main support of clam-digging industry (3804,p120); highly esteemed for food (2227,p63)

Saxidomus giganteus Deshays 1839 - continued

Food: Plankton feeder (3802,p287)

Repro: 1/2 spawn after 3rd year (45 mm) and 1/2 spawn after 4th year (55 mm), gametes mature all summer--spawning may be in July and August (2232,p277); spawns in summer (3804,p120); hint that minimum temp. necessary for spawning (2232,p276); spawning (2345,p198)

Temp: Tolerance to high temp. or rapid temp. changes little known.

Saxidomus nuttalli Conrad 1837

Dist: Humboldt Bay, Calif. to San Quintin Bay, Baja Calif. (2227,p64)

Hab: 12-18" in mud, sand, sandy mud of bays, lagoons, estuaries; exposed at low tide (2227,p64)

Ecology: Humboldt Bay (3380)

Transennella tantilla (Gould, 1852) - (2033,p237)

Dist: Sitka, Alaska to Lower Calif. (2209,p150), 27-57°N (2551)

Coll: Central Calif. coast (2033,p237)

Hab: Intertidal and subtidal (2578,p73)

Misc: Sediment size not a controlling factor on distribution, size or abundance (2578,p75)

Food: Suspension feeder, diatoms, Navicula, Bidulphia, Coscinodiscus (2578,p73)

Venerupis kennerleyi (Carpenter)

Marcia kennerleyi - (2031,p221)

Humilaria kennerleyi - (2551)

Dist: Alaska to southern Calif. (2209,p150), 37-57°N (2551)

Hab: Burrowing (2031,p221)

Venerupis semidecussata

Venerupis japonica (Deshayes) - (3804,p120) (2571,p57)

Dist: British Columbia to Elkhorn Slough, Calif. (2227), 37-55°N

Coll: Central Calif. coast (2033,p237), along coast of Strait of Juan de Fuca (2730,p247)

Hab: Intertidal (2033,p237), coarse muddy sand of bays, sloughs, estuaries, less than 2" below surface (2227,p67)

Temp: Tolerances to high temp. or rapid changes little known (2730,p247)

Misc: Commercially important (3804,p120), probably arrives with seed oysters from Japan (3804,p120)

Venerupis? tenerrima

Protothaca tenerrima (Carpenter 1856) - (2227,p65); Carpenter 1865) - (2033)

Dist: British Columbia to Magdalena Bay, Baja Calif. (2227), 23-49°N (5591)

Coll: Central Calif. coast (2033,p237)

Hab: Mostly found in firm, sandy mud of bays, sloughs and estuaries at 10-16" (2227,p65); intertidal (2033)

Family: Petricolidae

Petricola carditoides Conrad, 1837 - (2033,p237)

Dist: British Columbia to Loma, Calif. (2209,p163), 25-49°N (5591)

Coll: Central Calif. coast (2033)

Hab: Intertidal

Family: Cooperellidae

Cooperella subdiaphana Carpenter, 1864

Dist: British Columbia to Gulf of Calif. (2209,p163), 23-53°N (2551)

Family: Mactridae

Mactra californica Conrad, 1837 - (2033,p237) (2227)

Dist: British Columbia to Magdalena Bay, Baja Calif. (2227), 24-48°N (2551)

Coll: Central Calif. coast (2033,p237)

Hab: Fine sand or firm muddy sand, particularly near bays, lagoons, estuaries; not common anywhere within range (2227,p86)

Schizothaerus - see Tresus

MOLLUSCA - PELECYPODA - Mactridae

Spisula alaskana Dall, 1894 - (2551)
Dist: Arctic Ocean to Puget Sound (2209,p193), 48-69°N (2551)

Spisula catilliformis Conrad, 1867 - (2551)
Dist: Washington to San Diego (2209,p194), 33-48°N (2551)

Spisula falcata Gould, 1850 - (2551)
Dist: Puget Sound to Lower Calif. (2209,p195), 24-48°N (2551)

Tresus capax (Gould, 1850)
Schizothaerus capax - (2551) (3084,p123) (3573)
Dist: Alaska to San Diego (2209,p196), 37-58°N (2551)
Misc: Ecology (3388)
Note: Reference (2227,p89) mentions in description of S. nuttallii that differences between S. capax were unknown when article was written.

Tresus nuttallii (Conrad, 1837)
Schizothaerus nuttallii - (2033,p237) (3573)
Common names: great Washington clam, geoduck (3814,p232), Gaper, summer clam, horse clam, otter shell, horse neck, big neck clam (2227,p89); other names see (3813,p9)
Dist: Alaska to Lower Calif. (2209,p196) (2227,p89), Alaska to San Diego (3814,p232), 37-58°N
Coll: Wash: Puget Sound (2031), outer coast Cape Grenville (Robt. Hitz, BCF); Ore: Coos Bay, Winchester Bay (2345,p185) (3813,p9); Calif: central coast (2033,p237)
Hab: Intertidal sandy beaches, bay and coastal waters (2033) (2031); mud bottoms of all bays and inlets according to bottom type (3814); fine sand or firm sandy mud buried 1-3' deep, also in outer coast in more quiet sheltered areas (2227,p89) (3813); high tide line to 100' (2227,p89)
Growth: (2345,p195)
Feeding: (2236,p18)
Ecology, Abundance, & Dist: (3813,p18) (3388)
Econ: Sport fishery in Wash., Ore., and Calif; used for food locally (2345,p185) (2227,p89) (3814,p232)

MOLLUSCA - PELECYPODA - Tellinidae

Family: Tellinidae

Macoma arnheimi Dall, 1916 - (2551)
Dist: Alaska to San Francisco (2209, p172), 38-55°N (2551)

Macoma brota Dall 1916 - (3751, p213)
Dist: Arctic Ocean to Puget Sound (2209, p171), 48-64°N (2551)
Coll: Strait of Georgia
Hab: Sub-littoral, greatest size below 40m, greatest density, biomass below 40m (3751)

Macoma calcarea (Gmelin, 1791) - (3751, p213); Gmelin, 1792 - (2033, p236)
Dist: Arctic Ocean to central Calif. (2209, p174), 37-72°N (2551)
Hab: Sub-littoral, density greatest, biomass greatest below 50m, size greatest below 50m, fine-grained sediment may limit distribution (3751, p213)

Macoma carlottensis Whiteaves, 1880 - (3751, p213)
Dist: 27-72°N (5591, p27)
Hab: Sub-littoral (3751, p213), no preference for depth or sediment grade

Macoma elimata Dumnill and Coan, 1968 - (3751, p213)
Coll: Strait of Georgia, Satellite Channel, widely distributed (3751, p213)
Hab: Sub-littoral, tolerance for wide range of sediment types, density greatest less than 40m, size greatest deeper than 40m, maximum biomass equal at shallow and deep stations (3751)

Macoma expansa Carpenter, 1865 - (2551)
Dist: 33-48°N (2551)

Macoma incongrua (van Martens, 1865) - (3751, p213) (2551)
Dist: Arctic Ocean to San Diego (2209, p170), 33-72°N (2551)
Coll: Strait of Georgia, Satellite Channel (3751)
Hab: Sub-littoral, maximum density: equal at shallow and deep; maximum biomass: equal at shallow and deep; regularly found on shell gravels with 2-3 knot currents; generally not found where sediment more than 50% silt-clay (3751, p213)

MOLLUSCA - PELECYPODA - Tellinidae

Macoma inconspicua (Broderip and Sowerby, 1829) - (2033)
M. balthica Linnaeus - (2033,p236)
Dist: 33-72°N (2551)
Coll: Central Calif. coast (2033)
Hab: Common in San Francisco Bay, upper tide level, mud flats, competitively excluded from low tide level with more shelter and less sediment overturn by Ampelisea miller, amphipod (3784,p222)
Feeding: Detritus feeder (3784,p230)

Macoma indentata Carpenter, 1866 - (2551)
Dist: 28-48°N (2551), 28-50°N (5591)

Macoma inquinata (Deshayes, 1854) - (3751,p207)
Dist: Bering Sea to central Calif. (2209,p172)
Coll: Strait of Georgia, Satellite Channel (3751)
Hab: Shallow water, intertidal (3751,p211)

Macoma irus (Hanley, 1845) - (2033,p236)
Dist: 37-64°N (2551)
Coll: Central Calif. coast (2033)
Hab: Intertidal

Macoma kelseyi Dall, 1900 - (2551)
Coll: 48°N (2551), Puget Sound (2209,p172)

Macoma nasuta (Conrad, 1837) - (2033,p236) (3814,p226) (3813,p14)
Dist: Alaska to Cape San Lucas, Lower Calif. (3814) (2227), 28-60°N (3814) (2209,p174)
Coll: Puget Sound; Ore: Yaquina Bay and larger bays; central Calif. coast (3813,p14)
Hab: Intertidal (2033,p236) (3751,p211); 6"-8" in muddy bays (3814,p226); heavy mud or sandy mud of sheltered bays, lagoons, estuaries: 4"-8" below (2227,p74); bays: 6"-8" below surface (3813,p14)
Misc: Very hardy and resistant to adverse conditions (3814,p226)
Repro: Spawning probably late spring or early summer (2345,p198)

Macoma planiuscula Grant and Gale - (2551)
Dist: 48-72°N (2551)

Macoma quadrana Dall, 1916 - (2551)
Dist: Alaska to Lower Calif. (2209,p175), 32-55°N (2551)

MOLLUSCA - PELECYPODA - Tellinidae

Macoma secta Conrad, 1837 - (2033,p236)

Dist: Vancouver Island, B. C. to Cape San Lucas, Baja Calif. (2209,p179), 23-49°N (2551)

Coll: Oregon bays (3813,pl5); central Calif. coast (2033,p236)

Hab: Intertidal (2033,p236); in sand about 1 1/2 inches below surface, both bays and beaches (3814,p226); clean sand or sandy mud of bays, lagoons, and estuaries; some 10-30' deep along outer coast in areas protected by points of land, breakwaters, small within few inches, larger go deeper (2227,p75)

Econ: Excellent flavor, seldom sought for food because so deep (2227,p75); edible but rarely used (in Oregon) (3813,pl5)

Temp Study of temp. acclimation (2987)

Macoma yoldiformis Carpenter, 1864 - (2551)

Dist: Puget Sound to San Diego (2209,pl77), 33-49°N (2551)

Coll: Strait of Georgia, Satellite Channel (3751,p207)

Hab: Sub-littoral; intertidal to 18m in B. C.; tolerant of considerable range of sediment grain sizes; shelter from strong currents necessary (3751,p213)

Tellina bodegensis Hinds 1844 - (2033,p236); Tellen (3814,p227)

Dist: Queen Charlotte Island, B. C. to Cape San Lucas, Baja Calif. (2227,p73) (3814), 23-54°N (2551)

Coll: Ore: entire coast (3813,pl7), dredged (3412), Coos, Tillamook and Yaquina Bays (3813,pl7); central Calif. coast (2033)

Hab: Intertidal; sand beaches; sandy beaches along outer coast and particularly in coarse shifting sand near entrances to bays, lagoons, and estuaries (2227,p73)

Misc: Edible

Tellina buttoni Dall, 1900 - (2033,p236)

Dist: 23-58°N (2551)

Coll: Central Calif. coast (2033); Oregon, 40-42m (3003,pl3)

Hab: Intertidal (2033,p236)

Feeding: Deposit feeder (2578,p74)

Misc: Sensitive to turbidity; >30% silt and clay limits size and distribution (2578,p74)

Tellina carpenteri Dall, 1900 - (2551)
Dist: Alaska to Gulf of Calif. (2209,p166), 8-55°N (2551)

Tellina modesta Carpenter, 1864 - (2551)
Dist: B. C. to Lower Calif. (2209,p167), 30-50°N (2551)

Tellina salmonea (Carpenter, 1864) - (2033)
Dist: Aleutians to San Diego (2209,p166), 34-56°N (2551)
Coll: Central Calif. coast
Hab: Intertidal; sensitive to turbidity (2578,p75)
Food: Suspension feeder in clean, coarse sediment deposit feeder in firm substrate, diet of copepods, diatoms (2578,p73)

Family: Garidae

Gari californica (Conrad, 1837) - (2033); (Conrad, 1849) - (2227,p81)
Dist: 33-55°N (2551), Forrester Island, Alaska to San Diego Bay, Calif. (2227,p81)
Coll: Central Calif. coast (2033)
Hab: Sand or sandy mud near entrances to bays, lagoons, and estuaries; sometimes found in eel grass beds or in sand under boulders used in breakwater construction; 6-8" beneath surface (2227,p81)
Misc: Edible

Gari (Psammobia) californica Conrad
Psammobia californica Conrad - (2031)
Dist: Aleutians to San Diego (2209,p185)
Hab: Sand burrower (2031), found at a depth of one inch in coarse sand and gravel, where it lies on right side with flat valve down, convex up; the siphon holes are generally about three inches apart at surface (3814,p227)

Family: Semelidae

Cumingia californica (Conrad, 1837) - (2033)
Dist: 23-41°N (2551)
Coll: Central Calif. coast, intertidal (2033,p236)

Semele rubropicta Dall, 1871 - (2033)
Dist: Alaska to Lower Calif. (2209,p180), 32-57°N (2551)
Coll: Central Calif. coast, intertidal (2033,p236)

Family: Solenidae

Siliqua patula Dixon, 1788 - (2227,p78) (3003)
Dist: Alaska to San Luis Obispo County, Calif. (5591,p46), 37-60°N
Coll: Wash: Copalis Beach, Roosevelt Beach, Mocrocks, Saddle Hill, Ocean City, Oyehut (3635); north of Columbia River (2345); Ore: north of Tillamook Head, abundant (2345,p183), north of Netarts Bay between Netarts and Cape Lookout and in Netarts Bay (2345,p183), north of Yaquina Head, Agate Beach between Yaquina and Alsea Bay, north of Heceta Head, north of mouth of Siuslaw River (2345,p183), 50m (3003,p13); Calif: central coast (2033,p237), Clam Beach (2686,p32)
Hab: Intertidal (2033,p237), broad sandy ocean beach or one with wide expanse of strong current (2031,p211), deep burrowing, fine sandy beaches; also inland side of spits (2571,p57), benthic fauna of intertidal and surf zone typically in sandy beaches facing open ocean, areas of fine-packed preferred; broad, level, sand beaches under surf line (3814,p230)
Misc: See Volume I for an intensive literature search.

See also Chapter 20
p. 296

Solen sicarius Gould, 1850 - (2033,p237) (3814,p228)
Dist: British Columbia, Vancouver Island to San Quintin Bay, Baja Calif. (2227,p77) (3814,p228), 30-49°N (2551)
Coll: Central Calif. coast (2033); Puget Sound (2031)
Hab: Intertidal, burrowing, in firm sandy mud of sheltered byas, sloughs, estuaries, digs smooth-lined, permanent burrow in which it moves readily up and down; most frequently under roots of eel grass and is an extremely active digger (2227,p77)

MOLLUSCA - PELECYPODA - Myidae

Family: Myidae

Cryptomya californica (Conrad, 1837) - (2033,p237)
Dist: Alaska to Mexico (2209,p199), 11-59°N (2551) (5591,p19)
Coll: Central Calif. coast, intertidal (2033)

Mya arenaria Linnaeus, 1758 - (2033,p237) (2571,p57) (3804,p121)
Dist: Alaska to Calif. (2227) (3805) (3814) (2031) (3804), 37-49°N (2551)
Coll: B. C. (3804,p121); Puget Sound (2031); Oregon coast in most protected bays and many rivers north of Coos Bay (3813,p11); central Calif. coast (2033)
Note: Mostly in bays and may not be outer coast form.
Hab: Intertidal (2033), soft mud in sheltered bays (3814,p233), 8-14" below surface, most in firm mud flats, some found in gravel and sand flats, mouths of small rivers, farther upbay in larger bays (3813,p11)
Growth & Repro: (2345,p185)
History: (3805) (3814)
Misc: Sport and commercial fishery in bays (2227,p90), preyed on by sting rays (3814,p233), 28% total live weight is edible (3813,p12)

Mya truncata Linnaeus, 1758 - (2033,p237)
Dist: Arctic Ocean to Puget Sound (2209,p198), 48-72°N (2551)
Coll: Wash: Puget Sound; central Calif. coast
Hab: Intertidal, burrowing, sand or mud (2031,p215)

Platyodon cancellatus (Conrad, 1837)
Dist: Queen Charlotte Islands, B.C. to San Diego Bay (2227,p91) 33-38°N (2551), 35-65°N (5591)
Coll: Central Calif. coast
Hab: Intertidal, heavy clay or soft rock near entrances to bays, lagoons, estuaries, exposed rocks (2227,p91)

Sphenia fragilis (Carpenter, 1857) - (2551)
B. C. to Mexico (2209,p200), 23-45°N (2551)

Sphenia ovoidea Carpenter, 1865 - (2551)
Aleutians to Puget Sound (2209,p200), 33-55°N (2551)

Hiatella arctica (Linnaeus, 1771) - (2033); Linnaeus 1767 - (3003,pl4) (2209,p208)
  Saxicave arctica
    Dist: Arctic Ocean to Panama (2209,p208), 8-72°N (2551)
    Coll: Oregon; central Calif. coast
    Hab: Common form in Monterey area identified as S. arctica is a nestler, there being no intertidal shales for it to bore into as the species is reported to do in Europe.

Hiatella pholadis
  Saxicave pholadis Linnaeus, 1771 - (2033)
    Dist: Arctic Ocean to Panama (2209,p209), 8-72°N (2551)
    Coll: Central Calif. coast
    Hab: This is possible more common as a borer in intertidal shales further north (2033,p238)

Panomya ampla Dall, 1898 - (2551)
    Dist: Aleutians to Puget Sound (2209,p206), 48-68°N (2551) (5591)

Panope generosa Gould, 1850 - (2033,p238) (3804,pl 24) (3814) (3813) (2227)
    Dist: Forrester Island, Alaska to Lower Calif., 28-55°N (2551)
    Coll: Wash: Coast of the Straits of Juan de Fuca (2730,p243), Puget Sound (2031); Ore: Netarts Bay (3813,pl6); central Calif. coast
    Hab: Intertidal, burrowing (2031), lowest tide levels in muddy sand of protected bays, up to 3 feet below surface (3804,pl 25); sandy mud of bays, sloughs, estuaries at 4' or more; at low tide, can locate on mud flats by columns of water they squirt in air (2227,p92); unshifting mud bottoms of sheltered bays (3814,p234)
    Habits: Due to habitat; safe from enemies; little need for activity; only exertion is siphon movement; this slight body movement enlarges cavity and accommodates growth (3814,p234)
    Temp: Tolerance to high temp. or rapid changes are little known (2730,p247)
    Misc: Edible

Panope solida - (2551)
    Dist: 38-48°N (2551)

Family: Pholadidae

Parapholas californica (Conrad, 1837) - (3814,p236)
    Dist: Coos Bay, Oregon to San Diego, Calif. (3814,p236), 33-43°N (2551)
    Coll: Central Calif. coast
    Hab: Intertidal (2033)

MOLLUSCA - PELECYPODA - Pholadidae

Pholadidea concamerata Deshayes, 1839 - (2551)
Dist: Bering Sea to San Diego (2209,p211), 33-60°N (2551) (5591)

Pholadidea conradi Valenciennes 1846 - (5591,p41)
Penitella conradi Valenciennes - (3798,p281)
Dist: Oregon to Baja Calif., 23-49°N (5591)
Coll: Ore: Cannon Beach (3798); Calif: Mendocino Co. (3798)
Hab: Intertidal to 10 fms (5591), reported infesting various molluscs, including mussels and abalones (3798,p281)

Pholadidea ovoidea Gould 1851 - (2227,p93)
Dist: Bering Sea to Gulf of Calif. (2209,p212), 23-60°N (2551) (5591)
Coll: Oregon (2347 as cited in 2344); Calif: (2227,p93)
Hab: Bores into shale, clay, sandstone, or other soft rock on open coast

Pholadidea parva (Tryon, 1865) (2033,p238)
Coll: Ore: Chetco Cove; Calif: central coast (2344,p8), 28-38°N (2551)
Hab: Intertidal

Pholadidea penita (Conrad, 1837) - (2033,p238)
Penitella penita
Dist: Alaska to Mexico (3814,p236) (2209,p211), 33-56°N (2551)
Coll: Puget Sound (2031); Ore: Yaquina Bay entrance (2346) Nye Beach--greatest abundance; other points both north and south (2345,p188), Cape Meares, Ocean Lake, Newport, Yachats, few south of Coquille River; central Calif.
Hab: Intertidal (2033,p238), burrows into sandstone (2031,p225)
Repro: Spawning on Oregon coast unknown at this time (2345,p198)

Pholadidea rostrata Valenciennes, 1846
Dist: British Columbia to San Diego, Calif. (2209,p213), 33-48°N (2551)
Coll: Oregon (2347 as cited in 2344)

Pholadidea sagitta Stearns, 1916 - (2551)
Dist: Puget Sound to Mexico (2209,p212), 19-48°N (2551)

Xylophaga mexicana Dall, 1908 - (2551)
Dist: 17-48°N (2551)

Xylophaga washingtona Bartsch, 1921 - (3003,p14)
Dist: British Columbia to Washington (2209,p216), 47-49°N (2551)
Coll: Oregon, 200-1000m (3003,p14)
Ecology: 200-1000m in wood off Oregon (3426)

Zirfaea pilsbryi Lowe 1931 - (2033,p238)
Zirfaea gabbi - (2227,p95) (3814,p235)
Dist: Alaska to Lower Calif. (3814,p235)
Coll: Ore: Sunset Bay, Coos Bay, Netarts Bay (2344,p7), central Calif. coast (2033,p238)
Hab: Intertidal, burrows 10-14" in hard clay, stiff clay or soft rock either in bays or on open coast (3814,p235) (2227,p95)

Family: Teredinidae

Bankia setacea (Tryon, 1863) - (2033,p238) (2551) (3804)
Dist: 23-61°N (2551)
Coll: B.C.; Oregon, 50-200m; central Calif. coast
Hab: Intertidal (2033,p238), wood borer (2031,p229)
Life Cycle: (3804)
Boring Activity: (3808,p340) (3826)

Family: Pandoridae

Pandora bilirata Conrad, 1855
Dist: Alaska to Lower Calif. (2209,p89), 27-61°N (2551) (5591,p39)

Pandora filosa Carpenter 1864
Dist: Bering Sea to San Pedro, Calif. (2209,p88), 34-60°N (2551) (5591,p39)

Pandora glacialis Leach, 1819
Dist: Arctic Ocean to Washington (2209,p89), 48-72°N (2551) (5591,p39)

Pandora grandis Dall, 1837
Dist: Bering Sea to Oregon (2209,p88), 45-57°N (2551), 45-60°N (5591,p39)

Pandora punctata Conrad, 1857
Dist: B. C. to Gulf of Calif. (2209,p90), 23-49°N (2551), 23-52°N (5591,p39)

Family: Lyonsiidae

Entodesma inflatum (Conrad, 1837) - (2033,p237)
Dist: 2°S-55°N (2551), B. C. to Ecuador (2209,p93)
Coll: Central Calif. coast, intertidal (2033,p237)

MOLLUSCA - PELECYPODA - Thraciidae

Entodesma saxicola (Baird, 1863) - (2033,p237)
Dist: Aleutians to San Pedro, Calif. (2209,p93), 30-54°N (2551)
Coll: Central Calif. coast, intertidal (2033,p237)

Entodesma scammoni Dall, 1871 - (2551)
Dist: B. C. to San Diego, Calif. (2209,p94), 33-55°N (2551)

Lyonsia californica Conrad, 1837
Dist: Puget Sound to Lower Calif. (2209,p91), 24-56°N (2551)
Coll: Central Calif. coast
Hab: Intertidal; muddy beaches in quiet waters with little suspended material (3806,p312), maximal distribution and abundance in mud with 85%-100% silt and clay (2578,p75)
Food: Suspension feeder (2578,p74)
Morphology: (3806)

Lyonsia pugetensis Dall, 1913
Dist: Alaska to Puget Sound (2209,p91), 42-55°N (5591,p25)

Lyonsia striata (Montagu, 1815)
Dist: Aleutians to Washington (2209,p92), 48-72°N (2551)

Mytilimeria nuttalli Conrad, 1837 - (2033,p237)
Dist: B. C. to San Diego, Calif. (2209,p94), 28-55°N (2551)
Coll: Central Calif. coast, intertidal (2033)

Family: Thraciidae

Thracia challisiana Dall, 1915
Dist: 37-55°N (2551) (5591,p50)

Thracia curta Conrad 1837 - (2551)
Dist: Bering Sea to San Diego, Calif. (2209,p84), 33-71°N (2551), 23-71°N (5591,p51)

Thracia trapezoides Conrad 1849 - (2551)
Dist: 36-56°N (2551); mostly fossil living in Puget Sound (2209,p84) 34-56°N (5591,p51)

Family: Poromyidae

Poromya beringiana Dall, 1916
Dist: Aleutians to Tillamook, Oregon in deep water (2209,p95), 45-55°N (2551) (5591,p43)

Poromya leonina Dall, 1916
Dist: 47°N (2551), 47-52°N (5591, p43)

Poromya tenuiconcha Dall, 1913
Dist: 32-57°N (2551), 32-60°N (5591, p43), Alaska to Lower Calif. (2209, p95)

Family: Cuspidariidae

Cuspidaria beringensis Leache, 1883
Dist: Bering Sea to Panama (2209, p100), 8-58°N (2551)

Cuspidaria californica Dall, 1886
Dist: Puget Sound to San Diego (2209, p101), 33-48°N (2551)

Cuspidaria planetica Dall 1908
Dist: Bering Sea to Lower Calif. (2209, p100), 32-60°N (2551)

Family: Laternulidae

Laternula (Laternula) limicola (Reeve, 1863)
Coll: Ore: Coos Bay, 150' from shore and in marsh channels
Remarks: Japanese bivalve may by establishing itself in our coastal waters (3792, p439)

Class: GASTROPODA
Subclass: Prosobranchia
Family: Acmaeidae

Acmaea sp.
Respiration: See (3769, p73) (3371, ;79)
Shell Damage and Repair: See (3770, p64)
Predator: Pachygrapsus crassipes (3767, p67)
Commensal: Hyale grandicornis (3765, p56)

Acmaea sp. - continued
Digestive System: See (3773, p88)
Carbohydrate Digestion Capabilities: (3774, p98)
Excretory System: See (3776, p109)

Acmaea asmi (Middendorff, 1849) - (2385, p9)
Dist: 30 [illegible] °N (2551)
Coll: C[illegible]. Coos Bay region; found between and under rocks
[illegible] -1.0 ft tide level, also attached to *Tegula* (2385, p9);
Central Calif. coast (2033, p260)
Hab: Intertidal (2033, p260), commensal on shell of *Tegula funebralis*, attracted to *T. funebralis* by tactilely, discovering a chemical attractant in *T. funebralis* shell (3766, p63)

Acmaea cassis (Eschscholtz, 1833) - (5591, p59)
Acmaea cassis pelta (Eschscholtz) - (2031) shield limpet
Dist: 38-60°N (5591, p59)
Coll: Puget Sound on rocks (2031, p309)

Acmaea cribaria (Carpenter, 1866) - (2345, p8)
Dist: 35-57°N (2551)
Coll: Ore: Coos Bay region; found on bare surfaces of larger rocks in mid-littoral zone (2385, p8)

Acmaea digitalis (Eschscholtz 1833) - (2551) (2031, p311) (5591, p58)
Fingered Limpet (3815, p15); (Eschscholtz, 1833) - (2385, p8)
Dist: 37-60°N (5591, p58), 19-55°N (2551)
Hab: Intertidal (2033, p260), high intertidal, rocky shores (3760, p246), on rocks where there is some surf and quite high on beach, usually in a shaded area (3815, p15), upper limit occurs sparsely above lowest highest high dist level (2751, p647)
Description & Photo: (3815, p15)
Habits: Orientation and movements on vertical rocks at various stages of tidal cycle (3759, p30), clustering behavior (3760, p45), in *Mytilus californianus* community succession (2233, p246)
Temp: High, low, and mid-intertidal animals have lethal temperature at 42 °C; submerged exposure to high temp. (3722, p84)

MOLLUSCA - GASTROPODA - Acmaeidae

Acmaea fenestrata cribraria (Carpenter, 1866) - (2033,p260)
Coll: Central Calif. coast (2033,p260)
Hab: Intertidal (2033,p260)

Acmaea insessa Hinds, 1842 - (2033,p260)
Dist: 25-27°N (2551)
Coll: Central Calif. coast, intertidal (2033,p260)

Acmaea instabilis (Gould, 1846 - (3815,p16) (2385,p9)
Dist: Alaska to Calif. (3815,p16), 37-51°N (2551), 32-60°N (5591,p59)
Coll: Ore: Coos Bay region (2385,p9); central Calif. coast (2033,p260)
Hab: Found on kelp stalks along B. C. coast (3815,p16); live specimens found on Alaria stipes near a -1.2 ft tide level; many empty shells found washed in between rocks (2385,p9); intertidal (2033,p260)

Acmaea limatula (Carpenter, 1866) - (3003,p14)
Dist: 21-48°N (2551)
Coll: Ore: 46m (3003,p14); central Calif. coast (2033,p260)
Hab: In Mytilus californianus community succession (2233,p260) intertidal (2033,p260), also (3755,p5); found on red encrusting algae Hildenbrandia and Peyssonelia (3755,p11)
Habits: Active only when submerged or splashed, high level of activity when tide rising (3755,p11), light responses (3758, p25)
Food: Microscopic algae and encrusting red and coralline algae Hildenbrandia, Peyssonelia, Lithophyllum, Lithothamnion (3755,p11)

Acmaea limatula morchii (Dall, 1878) - (2033,p260)
Coll: Central Calif. coast (2033,p260)
Hab: Occurs in Tomales Bay, possibly only an ecological variant of A. limatula (2033,p260)

Acmaea mitra (Eschscholtz, 1833) - (2385,p7) (2031,p305)
Dist: Alaska to Calif. (3815,p17), 34-56°N (2551), 32-60°N (5591,p59)
Coll: B. C. coast, common (3815,p17); Wash: Puget Sound, on rocks (2031,p305); Ore: Cape Arago district, found clinging to smooth lower surfaces of large rocks and more especially as inhabitants of deserted sea urchin beds where they cling to walls of pits hidden by overhanging algae; most living specimens found were deeply encrusted with pink coralline algae giving their shells a nodulous appearance (2385,p8); 46m (3003,p14); Sunset Bay (2751,p667); central Calif. coast (2033,p260)

Acmaea mitra - continued
Hab: Intertidal (2033,p260), rocky beaches at low tide, taken from deeper water on set-lines and other gear (3815,p17), upper limit coincides with lowest higher low water (2751, p649)
Feeding on Algae: (2031,p305)

Acmaea ochracea (Dall, 1871) - (2033,p260)
Dist: 34-54°N (2551)
Coll: Central Calif. coast (2033,p260)
Hab: Intertidal (2033,p260)

Acmaea paleacea (Gould, 1851) - (2551) (2385,p9)
Dist: 29-49°N (2551)
Coll: Ore: Coos Bay region, found on Zostera strands in mid-littoral zone (2385,p9); central Calif. coast (2033,p260)
Hab: Intertidal (2033,p260)

Acmaea pelta - (2551), Eschscholtz, 1833 - (2385,p8); (3815,p18)
A. cassis - (2033,p260)
Dist: Alaska to Mexico (3815,p18); 19-60°N (2551)
Coll: Common on B. C. coast (3815,p18); Ore: Cape Arago region, abundantly distributed along rocky shores; specimen found creeping on large flat thalli on such algae as Laminaria and Alaria; most found in upper littoral zone (2385,p8), Sunset Bay (2751,p647); Calif: central coast (2033,p260)
Hab: On rocks and seaweeds, from lowest low to highest high tide (3815,p18), intertidal (2033,p260); low, intermediate intertidal (3755,p11), upper limit lowest higher high (2951,p648); large, non-encrusting algae
Food: Macroscopic algae: Rhodoglossum affine, Endocladia muricata, Iridaea sp.--red algae; Pelvetia fastigiata, Egregia menziesii--brown algae (3756,p19); feeding and movement occurred when submerged or splashed (3756,p19)
Growth: See (3576), shell shape dependent on substrate and exposure; shell color may be related to diet (3768,p72)
Description & Photo: (3815,p18)

Acmaea persona - (2551); (Eschscholtz, 1833) - (2385,p8)
Mask Limpet (3815,p19)
Dist: 37-60°N (2551), common Alaska to Calif. (3814,p19)
37-55°N (3788,p336)
Coll: Ore: Coos Bay region, inhabitant of mid-littoral zone, on smooth lower surfaces of large immovable rocks; usually small green algae of the genera

Acmaea persona - continued
Enteromorpha or *Ulva* are growing on the shells (2385, p8); central Calif. coast (2033, p260)
Hab: Intertidal (2033, p260), intertidal: mean sea level to mean higher high water, characteristically in sheltered areas; in *Mytilus californianus* community succession (2233, p246); on rocks high on the beach, often where some fresh water seeps out and in the shade of overhanging trees or cliffs (3815, p19)
Life Span: Probably 6+ years (3788, p338)
Temp: Winter range 3.4°C to 10.3°C
Summer range 8.5 C to 31 C
Annual rate of shell growth primarily related to seasonal differences in environmental temperatures in the intertidal zone (3788, p338)
Description & Photo: (3815, p19)
Habits: Nocturnal in habit (3815, p19)

Acmaea rosacea (Carpenter, 1866) - (2033, p260)
Dist: 16-56°N (2551)
Coll: Central Calif. coast (2033, p260)
Hab: Intertidal (2033, p260)

Acmaea scabra (Gould, 1846) - (2385, p9)
Dist: 23-48°N (2551) (5591, p60)
Coll: Ore: Coos Bay region, found near high-tide line and on rocks just above wave action (2385, p9); central Calif. coast (2033, p260)
Hab: Intertidal (2033, p260), in *Mytilus californianus* community succession (2233, p246)
Habits: Homing behavior (3761, p52)
Temp: High intertidal animals, lethal temp. 44°C; mid-intertidal animals, lethal temp. 43°C; low intertidal animals, lethal temp. 42°C, submerged exposure to high temp. (3772, p84)
Digestion: Metabolic activity and glycogen stores (3775, p102)

Acmaea scutum - (2551);(Eschscholtz, 1833) - (2385, p8)
Acmaea testadiadinalis scutum
Dist: 34-56°N (2551)

Acmaea scutum - continued
Coll: Ore: Common along rocky shore line of Cape Arago; fastens itself tightly on algae-covered rocks and frequently has such small algae as Ulva or Enteromorpha growing on its shell (2385, p8), mid-tide zone on rocky shores along Calif. coast (3757, p20)
Habits: Effect of light and tide on movements (3757, p20)

Acmaea scutum patina (Eschscholtz) Plate Limpet
Coll: Wash: Puget Sound on rocks (2031, p307); Ore: Sunset Bay (2751, p647)
Hab: Upper limit coincides with lowest higher high (2751, p647); vertical dist. (See 2751)

Acmaea triangularis (Carpenter, 1866) - (2033, p260)
Coll: Central Calif. coast (2033, p260)
Hab: Intertidal (2033, p260)

Lottia albomaculata - (2551)
Dist: 30-42°N (2551)

Lottia gigantea (Sowerby, 1843) - (2033, p260)
Dist: 28-42°N (2551)
Coll: Central Calif. coast (2033, p260)
Hab: Intertidal (2033, p260), in Mytilus californianus community succession (2233, p246)

Family: Lepetidae

Lepeta alba Dall, 1869 - (2551)
Dist: 48-60°N (2551) (5591, p92)

Lepeta caecoides Carpenter, 1865 - (2551)
Dist: 37-72°N (2551) (5591, p92)

Lepeta concentrica Middendorff, 1851 - (2551)
Dist: 48-70°N (2551) (5591, p92)

Family: Scissurellidae

Scissurella kelseyi Dall, 1905 - (2551)
Dist: 32-55 N (2551), 32-60 N (5591,p111)

Family: Haliotidae

Haliotis cracherodii (Leach, 1918) Black Abalone (2033,p260)
Dist: Oregon to Lower Calif.
Coll: Oregon (2344); central Calif. coast (2033,p260)
Hab: Intertidal to 100 feet (3007,p143) (2033,p260)
Feeding: Color of new shell growth related to diet (3779,p137)

Haliotis kamtschatkana (Jonas) - (3007,p156) (3815,p21)
Northern Abalone (3815,p121), Japanese Abalone, Small North Abalone
Dist: Sitka, Alaska to Calif. (3007,p156, Japan, Alaska to Calif. (3815,p22)
Coll: Wash: Puget Sound on rocks (2031,p303); Oregon (2344)
Hab: "On rocky beaches in colonies at below low-tide level to 6 fms; in Georgia Strait they are rarely intertidal; abalones seem to favor surf-lashed rocks on exposed reefs, but they sometimes are found in numbers in more sheltered waters; they seem to congregate where pink coralline algae thrive." (3815,p22)
Habits: Ordinarily slow pace, but can travel with considerable speed if threatened by starfish predation (3815,p22)
Econ: Shell too thin to be used commercially, but good eating. Small market for frozen whole abalones (3815,p22)

Haliotis rufescens (Swainson, 1822) Red Abalone - (2033,p260)
Dist: Nesika Beach, Oregon to Lower Calif. (2344,p8) (3007,p148)
Coll: Central Calif. coast (2033,p260)
Hab: Intertidal to 100 ft (2033,p260), subtidal (2344,p8)
Feeding: Feeds by extending its epi podium and capturing pieces of macroalgae that float by in the drift (3799,p135); primary component of diet is *Nereocystis luetkeana* in Morro Bay (3779,p135); color of new shell growth related to diet (3779,p136)

Haliotis rufescens - continued
Econ: Commercially important in Northern Calif.

Haliotis wallalensis (Stearns, 1899) - (2385, p6) No. Green Abalone
Dist: Oregon to Calif. (2385)
Coll: Ore: Coos Bay region (2385), Cape Blanco and Cape Arago (2344, p8); Calif: north central coast (2033, p260), Pt. Conception, rare (3007, p158)
Hab: Attached to flat walls of rock cave (2385, p6)

Family: Fissurellidae

Diodora aspera (Eschscholtz) - (2385, p5) Rough Keyhole Limpet (3815, p23)
Dist: 24-60°N (2551) (5591), Alaska to Lower Calif. (2583, p65) (3815, p23)
Coll: Ore: Coos Bay region (2385, p6), Cape Arago region (2021); central Calif. coast (2033, p260)
Hab: Lower littoral region on algae-covered rocks and in abandoned rock pits of Strongylocentrotus purpuratus (2385, p6), intertidal (2033, p260), algal covered rocks (2021), rocks in low intertidal zone of open coasts (2583, p65), on rocky beaches at low-tide level, also brought up from 8 fms (3815, p23)
Habits: In mantle cavity of Diodora aspera, often find commensal scale worm Arctonoe vittata (Grube) (3815, p24)

Diodora murina (Dall, 1885) - (2033, p260)
Dist: 21-42°N (2551)
Coll: Central Calif. coast, intertidal (2033, p260)

Fissurella volcano (Reeve, 1849) - (2033, p260)
Dist: 8-42°N (2551)
Coll: Central Calif. coast (2033, p260)
Hab: Intertidal (2033, p260)

Hemitoma bella Gabb, 1865 - (5591, p89)
Hemitoma yatesii Dall - (5591)
Dist: 37-55°N (2551), 33-57°N (5591)

MOLLUSCA - GASTROPODA - Fissurellidae

Megatebennus bimaculatus (Dall, 1871) - (2033,p260)
Spotted Keyhole Limpet (3815,p25)
Dist: 21-55°N (2551), Alaska to Mexico (3815,p25)
Coll: Ore: Coos Bay region (2385,p6); Calif: central coast (2033,p260)
Hab: Intertidal (2033,p260), on holdfasts of large seaweeds along south and west coasts of Vancouver Island, sometimes in shallow water under stones, has been dredged in 15 fms off Calif. coast (3815,p25)

Puncturella cooperi Carpenter 1864 - (2551)
Dist: 33-55°N (2551), 32-60°N (5591,pl10)

Puncturella cucullata (Gould, 1846) - (3003,pl5)
Dist: 23-58°N (2551)
Coll: Oregon, 100-106m (3003,pl5)

Puncturella (Cranopsis) decorata (Cowan and McLean, 1968) - (2586,pl07)
Dist: Sitka, Alaska to Cortez Bank, Calif. (2586)

Puncturella galeata Gould, 1846
Dist: 34-54°N (2551) (5591,pl10)

Puncturella multistriata (Cranopsis) - (2586,pl07); (Dall, 1914); (2551)
Dist: 33-52°N (2551), 8-60°N (5591,pl10), Aleutian Islands to Puget Sound, dredged in depths up to 50 fms (2586,pl07)

Family: Trochidae

Calliostoma annulatum (Martyn, 1784) Ringed Top Shell (3815,p30)
Ringed Top Snail (3003,pl5)
Dist: 33-55°N (2551), Forrester Island, Alaska to San Pedro, Calif. (3815,p30)
Coll: Wash: Puget Sound (2031,p299); Ore: 46m (3003,pl5); central Calif. coast (2033,p260)
Hab: Intertidal (2033,p260), on rocks, nearshore or deep water (2031,p299), not commonly found on beach,

Calliostoma annulatum - continued
sometimes on kelp at south end of Vancouver Island; apparently an inhabitant of deeper water (3815,p30)

Calliostoma caeruleum Dall, 1919
Dist: 37-48°N (2551) (5591,p75)

Calliostoma canaliculatum (Martyn, 1784) - (2033,p260)
Dist: 33-57°N (2551)
Coll: Central Calif. coast, intertidal (2033,p260)

Calliostoma costatum (Martyn, 1784) - (2033,p260)
Calliostoma ligatum Gould - (38-5,p29) Blue Top Snail
Dist: 33-57°N (2551), Alaska to San Pedro, Calif. (3815,p29)
Coll: Central Calif. coast (2033,p260), Puget Sound on rocks at low tide or shallow water (2031,p297)
Hab: Intertidal (2033,p260), in climacti biotic *Mytilus californianus* community (2233,p246), very common on rocks and in crevices on rocky beaches, dredged from 7 fms near Vancouver Island (3815,p29)
Note: Found in stomach of lingcod (3815,p29)

Calliostoma pictum Dall, 1919
Dist: 37-48°N (2551)

Calliostoma variegatum (Carpenter 1865) Variegated Top Snail
Dist: 28-57°N (2551)
Coll: Puget Sound, deep water (2031,p299)

Cidarina cidaris A. Adams 1864
Dist: 30-60°N (5591,p79)
Coll: Oregon, 46-126m (3003,p15)

Halistylus subpupoideus Tryon, 1887
Dist: 8-55°N (2551), B. C. to Panama (2026,p173)

Margarites funiculatus Carpenter, 1864
Dist: 48°N (2551)
Coll: Wash: Neah Bay (2207,p200)

MOLLUSCA - GASTROPODA - Trochidae

Margarites helicinus - (2551); (Phipps, 1774)   Smooth Margarite
(3815,p31)
Dist: 33-65°N (2551), 32-65°N (5591,p98), Bering Strait to Calif., Greenland to Massachusetts, Northern Europe (3815,p31)
Hab: Deep water species but often on beach, especially on eel grass or other marine vegetation (3814,p31)

Margarites inflatulus Dall, 1921
Dist: 48°N (2551), 48-50°N (5591,p98)

Margarites lacunatus Carpenter, 1864
Dist: 33-48°N (2551), 33-41°N (5591,p98)

Margarites lirulatus (Carpenter, 1864) - (2033,p261)
Dist: 33-57°N (2551), Alaska to San Pedro, Calif. (3815,p32)
Coll: Central Calif. coast (2033,p261)
Hab: Intertidal (2033,p261), common on sheltered rocky beaches, also dredged from 5-10 fms (3815,p32)

Margarites marginatus Dall, 1919
Dist: 44-72°N (2551)

Margarites obsoletus - (2551)
Dist: 48°N (2551) (5591,p99)

Margarites parcipictus (Carpenter, 1864) - (2033,p261)
Dist: 29-57°N (2551)
Coll: Central Calif. coast, intertidal (2033,p261)

Margarites pupillus (Gould, 1849) - (2385,p7)
Dist: 34-60°N (2551), Alaska to San Pedro, Calif. (3815,p33)
Coll: Puget Sound (2031,p301); Ore: Coos Bay region (2385,p7)
Hab: In eel grass and on rocks in tide pools or shallow water (2031,p301), found in close association with *Zizyphinus* (2385,p7), common on sheltered rocky beaches, also dredged from 5-10 fms (3815,p33)

Margarites rhodia Dall, 1920
Dist: 33-58°N (2551), 32-60°N (5591,p99)

Margarites salmoneus Carpenter, 1864
Dist: 37-48°N (2551) (5591)

Margarites subelevatus Carpenter, 1864
Dist: 48°N (2551)
Coll: Wash: Neah Bay (2026, p208)

Margarites succinctus (Carpenter, 1864) - (2385, p7)
Dist: 30-57°N (2551), Alaska to Lower Calif. (3815, p34)
Coll: Ore: Coos Bay region (2385, p7); central Calif. coast (2033, p261)
Hab: Intertidal (2033, p261), lives under rocks usually in same habitat as Homalopoma carpenteri (2385, p7), on algae and eel grass near low tide level (3815, p34)

Margarites tenuisculptus Carpenter, 1865
Dist: 48°N (2551), 40-50°N (5591, p100)

Solariella obscura Couthoug, 1838
Dist: 48-72°N (2551) (5591)

Solariella peramabilis Carpenter, 1864
Dist: 32-55°N (2551) (5591)

Tegula brunnea (Philippi, 1848) - (2033, p261)
Dist: 34-42°N (2551), Oregon to Calif. (2339, p233)
Coll: Ore: Coos Bay, Cape Arago (2339, p233); central Calif. coast (2033, p261)
Hab: Intertidal (2033, p261), outer intertidal (2339, p233), associated with T. palligo and Macrocystis in climactic biotic Mytilus californianus community (2233, p246)
Repro: (2339, p233)

Tegula fluctuosa Dall 1919
Dist: 34-40°N (2551)

Tegula funebralis (A. Adams, 1854, 1855?) - (2385, p6)
Dist: 28-48°N (2551), B. C. to Lower Calif. (3815, p25)
Coll: Puget Sound (2031, p295), central Calif. coast (2033, p261) abundant on Oregon and Calif. coasts (2385, p6)

Tegula funebralis - continued

Hab: Intertidal (2033, p261), mid-tide level to fairly high on rocky beaches (3815, p26), found on upper exposed rocks as well as on algae-covered rocks near low-tide line (2385, p6)

Feeding: Eats only algae (2031, p295)

Sex: Male: foot surface light; female: foot surface dark (3791, p440)

Note: Edible (3185, p26), heavy shells withstand force of surf in rocky places (3815, p27)

Tegula pulligo - (2551) Dusky Turban (3815, p28);
(Gmelin, 1784) - (2385, p6) (3815, p28); (Martyn, 1784) - (2033, p261)

Dist: 28-57°N (2551), Alaska to Lower Calif (3815, p28)

Coll: Not Strait of Georgia (3815, p28); Ore: Coos Bay region (2385, p6); central Calif. coast (2033, p261)

Hab: Intertidal (2033, p261), open rocky beaches from about 10-ft level to below lowest tide (3815, p28), buried in sand under algae-covered rocks at -0.6 ft tide level (2385, p6)

Tegula pulligo taylori (I. S. Oldroyd, 1922) - (2385, p7)

Coll: Ore: Coos Bay region (2385)

Hab: Upper littoral zone among other Trochidae (2385)

Tegula subaperta Carpenter, 1864

Dist: 33-48°N (2551)

Tegula taylori Oldroyd, 1922

Dist: 49°N (2551), 48-54°N (5591, pl14)

Family: Carinariidae

Carinaria latidens Dall, 1919

Dist: 43°N (2551)

MOLLUSCA - GASTROPODA - Epitoniidae

Family: Epitoniidae

Epitonium acrostephanus Dall 1908
Dist: 33-48°N (2551), 32-48°N (5591, p85)

Epitonium caamanoi Dall and Bartsch, 1910
Dist: 34-48°N (2551), 39-49°N (5591, p86)

Epitonium catalinae Dall, 1958
Dist: 33-55°N (2551), 32-55°N (5591, p86)

Epitonium columbianum Dall, 1917
Dist: 23-55°N (2551) (5591, p86)

Epitonium crebricostatum Carpenter, 1886
Dist: 23-49°N (2551), B. C. to Gulf of Calif. (2206, p61)

Epitonium densiclathratum Dall, 1917
Dist: 33-48°N (2551) (5591, p86)

Epitonium evictum DeBoury, 1919
Dist: 25-55°N (2551), Alaska to Lower Calif. (2026, p53)

Epitonium indianorum (Carpenter, 1865) - (2385, p12)
Dist: 32-55°N (2551), 32-60°N (5591, p86)
Coll: Ore: Coos Bay region, found in tide pools near -1.0 ft tide
level (2385, p12); 128-146m (3003, p15)

Epitonium spongiosum Carpenter, 1864
Dist: 37-45°N (2551), Oregon to central Calif. (2206, p54)

Epitonium tinctum Carpenter 1864
Dist: 23-49°N (2551), 23-51°N (5591, p87)

Epitonium wroblewskyi Morch, 1876
Dist: 40-55°N (2551), Alaska to San Diego (2026, p52)

Opalia chacei (Strong, 1932) - (2385, p12); 1930 - (2033, p261)
Dist: 34-43°N (2551), 34-49°N (5591, p107)
Coll: Ore: Coos Bay region (2385, p12); central Calif. coast
(2033, p261)
Hab: Intertidal (2033, p261)

Opalia evicta DeBoury, 1919
Dist: 25-55°N (2551) (5591, p107)

Family: Eulimidae

Melanella macra Bartsch, 1917
Dist: 48-55°N (2551)

Melanella montereyensis Bartsch 1917
Dist: 37-41°N (2551), Trinidad to Monterey, Calif. (2026,p69)

Melanella randolphi Vanatta, 1899
Dist: 48-55°N (2551)

Melanella rutila Carpenter, 1864 - (2551) Red Melanella (3815,p63)
Dist: 25-55°N (2551), Alaska to Lower Calif. (3815,p63)
Hab: On sea urchins, sea cucumbers, and starfish at low tide level and below (3815,p63)

Family: Cocculinidae

Cocculina agassizii Dall, 1908
Dist: 8-54°N (2551), 7-54°N (5591,p80)

Family: Turbinidae

Astraea inaequalis (Martyn, 1784) - (2033,p261)
Astraea gibbeross Dillwyn
Dist: 33-48°N (2551), Masset, B. C. to San Pedro, Calif. (3815,p35)
Hab: Intertidal (2033,p261), rocky beaches, sheltered or open, usually from 3-ft level to below low tide but occasionally as high as 6-ft level (3815,p36)

Homalopoma bacula Carpenter, 1864
Dist: 30-48°N (2551), 30-52°N (5591,p90)

Homalopoma engbergi (Willett, 1929)
Dist: 48°N (2551), 48-53°N (5591,p90)

Homalopoma luridum Dall, 1885 - (2551)
Dist: 23-48°N (2551), 23-57°N (5591,p90)

MOLLUSCA - GASTROPODA - Turbinidae

Homalopoma carpenteri - (2551); (Pilsbry, 1888) - (2385,p7);
Carpenter Dwarf Turban (3815,p37)
Dist: 30-57°N (2551), Alaska to Lower Calif. (3815,p37)
Coll: Ore: Coos Bay region (2385,p7); central Calif. coast (2033,p261)
Hab: Intertidal (2033,p261), fairly deep water, but taken alive at low tide in several B. C. locations (3815,p37), common on undersides of rocks in lower littoral zone, frequently in close association with Bittium eschrichtii (2385,17)
Note: Shells are popular with hermit crabs (3815,p37)

Family: Phasianellidae

Phasianella lurida (Dall, 1897)
Tricola lurida
Dist: 45°N (2551), B. C. to Mendocino, Calif. (2026,p163)

Family: Littorinidae

Littorina littorea (Linnaeus, 1758)
Coll: Wash: Puget Sound; Calif: Trinidad, San Francisco Bay (3786,p283)
Note: Appears species accidentally introduced into above localities, means of introduction problematical (3786,p283) [Atlantic Coast species]
Biology: (2255,p721)

Littorina planaxis (Philippi, 1847) - (2033,p261)
Dist: 19-48°N (2551)
Coll: Ore: Coos Bay region (2385,p11); central Calif. coast (2033,p261)
Hab: Intertidal (2033,p261), abundant on rocks just above Mytilus edulis beds (2385,p11), high intertidally usually on exposed rocks in splash zone (2577,p53),
Temp: More tolerant of dessication, temp., and fresh water than L. scutulata (2577,p53), held in dry containers, 29.4°C - 32.2°C 127 hrs, none dead (2577,p44)
Food: Microscopic encrusting forms (2577,p51)

Littorina rudis Donovan, 1800
Dist: 48-56°N (2551)

Littorina sitkana - (3506); (2551); (Philippi)
L. sitchana - (2026,p60)   Sitka Littorine (3815,p39)
Dist: Alaska to Oregon (3506,p33) (3815,p39), 48-56°N (2551) (5591)
Coll: Ore: Sunset Bay, mouth of Salmon River (124°0', 45°3'), Siletz Bay (124°1', 44°47130"), Winchester Bay (124°11'30", 43°40'20") (3506)
Hab: Feed on microscopic algae (3506,p35), found only in protected bays, on or under rocks, esp. rocks covered with Balanus sp., at Sunset Bay only small individuals were found and all on Fucus sp., on Fucus sp. at all localities; detailed description of habitats at localities (3506,p42); on rocks, pilings, eel grass, kelp, low-tide to high-tide levels (3815,p39)
Vertical Range: Between +2 and +7' at Salmon River, greatest density at 4' (3506,p28)
Dessication Results: (3506,p5,31)
Salinity: Lowest limit 16-20‰ (3506,p5,33)
Temp: Ceased all movements 34-36.5°C (3506,p5,33,39)
Immersion Studies: (3506,p5,39)

Littorina scutulata (Gould, 1849) - (2033,p261)
Checkered Littorine (3815,p40); Checkered Periwinkle
Dist: 19-58°N (2551), Alaska to Calif. (3815,p40)
Coll: Ore: north central coast, Yaquina Bay region, Coos Bay region (3506,p7); Puget Sound (2031,p281); Calif. (2033)
Hab: Rocky intertidal areas, bays and estuaries, observed on Balanus sp. or Fucus sp. (3506,p13), some individuals in tide pools on Ulva and bushy green alga, some on bare rock in splash zone at +10-12' above 0' tide level in exposed areas (3506,p13), mid-intertidal, frequently in beds of macroscopic algae and pools rimmed with algae (2577,p53), intertidal (2033,p261), rocky shores (3815,p40)
Vertical Range: Between +3 and +12 for exposed rocky intertidal areas, in estuaries +3.5-8' in Yaquina Bay and +1-7' at Salmon River (3506,p28)

Littorina scutulata (Gould, 1849) - continued
Density: Greatest in tidepools at about +3' level, +6.5' at Yaquina Bay, and +4' at Salmon River (3506,p28)
Zonation Studies: Done at Yaquina Head, results (3506,p3,14,17)
Dessication Results: (3506,p5,31)
Salinity: Lowest limit 16-20‰ (3506,p5, 32)
Temp: Ceased all movements at 34-36.5°C (3506,p5,33,39)
Immersion Studies: (3506,p5,39)

Littorina subrotundata Carpenter 1865
Dist: 48°N (2551)
Coll: Wash: Neah Bay (2026,p63)

Family: Lacunidae

Lacuna porrecta - (2551); Carpenter 1864 - (2385,p11)
L. striata (Gabb) - (3815,p42)
L. carinata (Gould) - (3815,p42)
Dist: 33-55°N (2551), Bering Sea to Calif. (3815,p42)
Coll: Ore: Coos Bay region (2385,p11); Puget Sound (2031,p283)
Hab: Found in tide pools on algae at same level as lower littorine beds (2385,p11), eel grass, holdfasts (2031,p283), on kelp (3815,p42)

Lacuna variegata Carpenter, 1864 - (3815,p41)
Dist: 34-48°N (2551), B. C. to Calif. (3815,p41)
Hab: Common to B. C. (3815,p41), on eel grass and seaweeds on rocky beaches (3815,p41)
Habits: Entirely aquatic, hence lower on beach than littorines (3815,p41)
Repro: Light-yellow eggs laid on kelp fronds (3815,p41)

Lacuna effusa Carpenter, 1864
Dist: 37-48°N (2551)

Lacuna exaequata Carpenter, 1864
Dist: 48°N (2551)

MOLLUSCA - GASTROPODA - Lacunidae

Lacuna marmorata - (2551); (Dall, 1919) - (2385,pl1)
Dist: 33-57°N (2551) (5591)
Coll: Ore: Cocs Bay region (2385,pl1)
Hab: Found in close association with other species of Lacuna and Littorina, though they tend to frequent lower tide levels than do the latter (2385,pl1)

Lacuna solidula Loven, 1846
Dist: 33-61°N (2551), 32-61°N (5591)

Family: Assimineidae

Syncera translucens Carpenter, 1864
Dist: 25-48°N (2551), B. C. to Lower Calif. (2026)

Family: Rissoidae

Alvania burrardensis - (2551)
Dist: 49°N (2551)

Alvania carpenteri Weinkauff, 1885
Dist: 37-55°N (2551), 36-54°N (5591)

Alvania compacta Carpenter, 1865
Dist: 33-55°N (2551), 33-57°N (5591)

Alvania filosa Carpenter, 1865
Dist: 48°N (2551), 48-57°N (5591)
Coll: Wash: Neah Bay (5591)

Alvania montereyensis Bartsch, 1911
Dist: 35-57°N (2551), 36-58°N (5591)

Alvania sanjuanensis Bartsch, 1921
Dist: 48°N (2551), 48-57°N (5591)

MOLLUSCA - GASTROPODA - Rissoidae

Barleeia haliotiphila Carpenter, 1864
Dist: 30-41°N (2551)

Barleeia marmorea Carpenter, 1864
Dist: 34-54°N (2551) (5591)

Barleeia oldroydi Bartsch, 1920
Dist: 33-49°N (2551), 33-54°N (5591)

Barleeia sanjuanensis Bartsch, 1920
Dist: 48°N (2551)

Rissoina newcombei Dall, 1897
Dist: 48-55°N (2551)

Family: Turritellidae

Tachyrhynchus lacteolus Carpenter 1865
Dist: 27-56°N (2551), 27-60°N (5591)

Tachyrhynchus pratomus Dall, 1919
Dist: 25-56°N (2551) (5591)

Tachyrhynchus reticulatus Mighels and Adams, 1842
Dist: 48-72°N (2551) (5591)

Tachyrhynchus subplanatus Carpenter 1865
Dist: 33-48°N (2551)

Turritellopsis stimpsoni Dall, 1919
Dist: 27-60°N (2551)

Family: Caecidae

Fartulum bakeri Bartsch, 1920
Dist: 23-61°N (2551)

Fartulum occidentale Bartsch, 1920
Dist: 28-60°N (2551)

Micranellum crebricinctum Carpenter, 1864
Dist: 30-55°N (2551)

Micranellum oregonese Bartsch, 1920
Dist: 33-60°N (2551)

Family: Vermetidae

Aletes squamigerus (Carpenter, 1856) - See Serpulorbis

Bivonia compacta Carpenter, 1864
Dist: 34-49°N (2551)

Dendropoma lituellus (Morck, 1861)
Sprioglyphus lituellus - (5591, p85)
Dist: 33-55°N (2551) (5591)

Petaloconchus complicatus Dall 1908
Dist: 8-48°N (2551), 8-49°N (5591)

Petaloconchus montereyensis (Dall, 1919) - (2033, p261)
Coll: Central Calif. coast, intertidal (2033, p261)

Serpulorbis squamigerus (Carpenter, 1856)
Aletes squamigerus - (2033, p261)
Dist: -1 to 55°N (2551)
Hab: Intertidal

Family: Cerithiidae

Bittium attenuatum (Carpenter, 1864)
Dist: 30-55°N (2551), Forrester Island, Alaska to Lower Calif. (3815, p45)
Hab: Rocky beaches or amongst seaweed, dredged to 35 fms (3815, p45)

Bittium boreale Bartsch, 1911
Dist: 48-54°N (2551) (5591)

Bittium chalisae Bartsch, 1917
Dist: 48°N (2551), 48-52°N (5591)

Bittium eschrichtii (Middendorff, 1849) - (2385,pl1)
Dist: 48-57°N (2551), Alaska to Calif. (3815,pl1)
Coll: Puget Sound (2031,p273); Ore: Coos Bay region (2385,pl2)
Hab: Live specimens abundant on undersurfaces of rocks at -1 ft to -0.6 ft level in sand beneath rocks (2385,pl2), rocks, grass or on algae (2031,p273), rocky beaches at low tide, also in salt marshes, among algae, and on oyster beds (3185,p44)

Bittium montereyense - (2551)
Dist: 23-43°N (2551)

Bittium munitum Carpenter, 1864
Dist: 37-57°N (2551) (5591)

Bittium oldroydae Bartsch, 1911
Dist: 34°N (2551), 28-48°N (5591)

Bittium vancouverense Dall and Bartsch, 1910
Dist: 48-60°N (2551) (5591)

Cerithidea californica (Haldeman, 1840) - (2033,p261)
Coll: Central Calif. coast, intertidal (2033,p261)

Cerithiopsis charlottensis Bartsch, 1917
Dist: 48-60°N (2551) (5591)

Cerithiopsis columna - (2551); (Carpenter, 1864) - (2385,pl2)
Dist: 37-48°N (2551), 32-50°N (5591)
Coll: Coos Bay, Oregon (2385,pl2)
Hab: Found in tide pools and under rocks (2385,pl2)

Cerithiopsis fraseri (Bartsch, 1921)
Dist: 48-50°N (2551)

MOLLUSCA - GASTROPODA - Cerithiidae

Cerithiopsis montereyensis Bartsch, 1911
Dist: 37-40°N (2551)
Coll: Mendocino to Monterey, Calif. (2026)

Cerithiopsis onealensis (Bartsch, 1921) - (2551)
Dist: 48°N (2551)

Cerithiopsis paramoea Bartsch, 1911
Dist: 48°N (2551)
Coll: Wash: Neah Bay (2026)

Cerithiopsis sigma (Bartsch 1921)
Dist: 48°N (2551)

Cerithiopsis stephensae Bartsch, 1909
Dist: 48-55°N (2551) (5591)

Cerithiopsis truncata Dall 1886
Dist: 48-55°N (2551), 48-57°N (5591)

Cerithiopsis willetti (Bartsch, 1921)
Dist: 48-55°N (2551) (5591)

Seila montereyensis (Bartsch, 1907) - (2033,p261)
Coll: Central Calif. coast, intertidal (2033,p261); 32-37°N (2551)

Family: Litiopidae

Diala acuta Carpenter, 1864
Dist: 27-48°N (2551)

Diala marmorea Carpenter, 1864
Dist: 34-54°N (2551)

Family: Hipponicidae

Hipponix antiquatus (Linnaeus, 1767) - (2033,p262)
Dist: -1 to 42°N (2551)
Coll: Central Calif. coast, intertidal (2033,p262)
Note: Possible synonym of *H. cranioides* (5591)

Hipponix barbatus Sowerby, 1835
Dist: 1°S to 42°N (2551), Crescent City, Calif. to Galapagos (2026)

Hipponix cranioides - (2551); (Carpenter, 1864)
H. antiquatus Linné
Dist: 34-48°N (2551), Queen Charlotte Islands to San Diego, Calif. (3815,p47)
Hab: On rocks at low tide (3815,p47)
Note: Shells often covered with algae making them hard to see (3815,p47)

Hipponix tumens (Carpenter, 1865) - (2033,p262)
Dist: 19-42°N (2551), also north of Vancouver Island (3815,p48)
Coll: Central Calif. coast (2033,p262)
Hab: Intertidal (2033,p262), on rocks (3815,p48)

Family: Calyptraeidae

Calyptraea fastigiata (Gould, 1846)
Dist: 48-56°N (2551) (5591), Alaska to Calif. (3815,p49)
Coll: Puget Sound (2031,p289)
Hab: On rocks and on each other (2031,p289), usually in fairly deep water but may be found at low tide on west coast of Vancouver Island, on rocks, other snails, floating kelp, or attached to crabs (3815,p49)

Crepidula adunca (Sowerby, 1925) - (2385,p19)
Dist: 23-48°N (2551), Queen Charlotte Islands to Lower Calif. (3815,p50)

Crepidula adunca - continued
Coll: Puget Sound (2031,p287); Ore: Coos Bay region (2385,pl1); central Calif. coast (2033,p262)
Hab: Found attached to shells of *Searlesia dira* and *Tegula funebralis* but some found on *Thais lamellosa* (2385,pl1), attached to rocks or other shells (2031,p287), intertidal (2033,p262), shallow water, on rocks or other shells, common on *Tegula pulligo* and *Calliostoma ligatum*, often on one another (3815,p50)

Crepidula fimbriata Reeve 1859
Dist: 23-49°N (2551)

Crepidula lingulata Gould 1846
Dist: 8-60°N (2551), Bering Sea to Panama, common along B. C. coast (3815,p51)
Hab: On rocks and on living gastropods (3815,p51)

Crepidula nivea C. B. Adams 1852
Coll: Puget Sound, adheres to rocks, shells or one another (2031,p285)

Crepidula nummaria (Gould, 1846)
Dist: 23-65°N (2551), Alaska to Panama (3815,p52)
Coll: Ore: Coos Bay region (2385,pl0); central Calif. coast (2033,p262)
Hab: Live specimens found attached to undersides of small rocks at -1.0 to -0.8 ft tide levels (2385,pl0), intertidal (2033,p262), shallow to very deep water on rocks and dead shells (3815,p52)
Habits: White slipper-shells are often found living in apertures of shells, particularly *Tegula* and *Polinices*, inhabited by hermit crabs (3815,p52)

Crepidula nummaria perforans (Valenciennes, 1846) - (2385,pl0)
Coll: Empty shells found in Coos Bay region (2385,pl0)

Crepidula orbiculata Dall, 1919
Dist: 33-60°N (2551)

Crepidula perforans (Valenciennes, 1846) - (2033,p262)
Dist: 8-48°N (2551)
Coll: Central Calif. coast (2033,p262)
Hab: Intertidal (2033,p262)

Crepipatella lingulata (Gould, 1846) - (2033,p262)
Coll: Central Calif. coast, intertidal (2033,p262)

Crucibulum spinosum Sowerby, 1854
Dist: 6°S to 42°N (2551), Trinidad, Calif. to Chile (2026,p116)

Family: Trichotropidae

Trichotropis cancellata (Hinds, 1843)
Dist: Bering Sea to Oregon (3815,p58) (2026,p41)
Coll: Puget Sound (2031,p275)
Hab: Rocky shores where water is cold, dredged to 25 fms (3815,p58)

Family: Natieidae

Eunaticina oldroydii (Dall, 1897)
Dist: 33-45°N (2551), 32-52°N (5591)
Note: Empty shells found on sands of Coos Bay region (2385,p10)

Natica clausi (Broderip & Sowerby, 1829)
Dist: Arctic Ocean to southern Calif.; also Arctic Ocean to North Carolina, northern Europe (3815,p56)
Hab: Usually this species is taken in deep water or sometimes from fish stomachs; where water is cold, deeper in sand than the moon snail (3815,p56)
Repro: Description of egg cases (3815,p56)

Natica russa Gould, 1859
Dist: 33-71°N (2551), 32-71°N (5591)

MOLLUSCA - GASTROPODA - Natieidae

Polinices algidus Gould, 1858
Dist: 48-55°N (2551) (5591)

Polinices canonicus Dall, 1919
Dist: 33-55°N (2551) (5591)

Polinices caurinus Gould, 1847
Dist: 33-64°N (2551), 32-55°N (5591)

Polinices draconis (Dall, 1903)
Dist: 32-58°N (2551), 31 -58°N (5591)
Coll: Ore: Coos Bay region, empty shells brought up in crab pots (2385,p10); central Calif. coast (2033,p262)
Hab: Intertidal (2033,p262)

Polinices grönlandicus Moller, 1842
Dist: 37-72°N (2551) (5591)

Polinices imperforatus Stearns, 1909
Dist: 33-42°N (2551), Crescent City, Calif. to San Diego (2026,p129)

Polinices lewisii (Gould, 1847) - (2551) (2385,p10)
Lunatia lewisi Gould - (3815,p55)
Dist: 33-51°N (2551), 31-50°N (5591)
Coll: Puget Sound, sandy beaches (2031,p291); Ore: empty shells found in Coos Bay region (2385,p10); central Calif. coast (2033,p262)
Hab: Intertidal (2033,p262), sandy, gravelly, or muddy flats in shallow water and down to 25 fms (3815,p54)
Feeding: Mechanism of feeding, important predator of clams (3815,p54)
Repro: Egg case description, eggs hatch mid-summer; larva have free-swimming period; small specimens obtained only with dredge (3815,p54)

Polinices nanus Moller, 1842
Dist: 33-72°N (2551) (5591)

Polinices pallidus (Broderip and Sowerby, 1829) - (2385,pl0) (2551)
Dist: 37-72°N (2551) (5591)
Coll: Ore: empty shell found between rocks, Coos Bay region (2385,pl0)

Polinices reclusianus (Deshayes, 1839)
Dist: 21-42°N (2551), Crescent City, Calif. to San Diego (2026)
Hab: Intertidal and subtidal (2576,p62)
Habits: Predator on Hysteroconcha (2576,p62)

Family: Lamellariidae

Lamellaria orbiculata Dall, 1871
L. stearnsii - (5591)
Dist: 23-54°N (2551)

Lamellaria rhombica Dall, 1871
Dist: 24-48°N (2551), Neah Bay, Washington to Lower Calif. (2026)

Lamellaria stearnsii Dall, 1871
Dist: 21-53°N (2551), 21-60°N (5591)

Family: Velutinidae

Velutina laevigata (Linnaeus, 1767)
Dist: 37-71°N (2551) (5591), circumboreal; Labrador to Massachusetts; Arctic Ocean to Calif. (3815,p57)
Hab: A cold water species found on rocks at low tide; dredged from 3-15 fms and from as deep as 50 fms farther south (3815,p57)
Habits: No operculum, clings to rock limpet-fashion (3815,p57), for protection, exudes frothy white slime (3815,p57)
Feeding: Thought to be carnivorous, probably feeding on small invertebrates as hydrozoans, compound ascidians, etc. (3815,p57)

MOLLUSCA - GASTROPODA - Velutinidae

Velutina prolongata (Carpenter, 1865) - (2385,p9)
Dist: 37-65°N (5591)
Coll: Ore: Coos Bay region (2385,p9)
Hab: Found in tide pools containing Zostera (2385,p9)

Velutina zonata Gould, 1841
Dist: 37-71°N (2551) (5591)

Family: Eratoidae

Trivia californiana (Gray, 1828)
Pusula californiana - (2033,p26)
Dist: 20-42°N (2551), Crescent City, Calif. to Mexico (2026)
Coll: Central Calif. coast, intertidal (2033,p261)

Family: Cymatiidae

Argobuccinum - See Fusitriton

Fusitriton oregonensis (Redfield, 1848)
Dist: Bering Sea to San Diego, Calif. (3815,p59), 33-59°N (2551), 32-60°N (5591)
Coll: Oregon, 88-200m (3003,p15)
Hab: Deep water, occasionally on beach (2031,p269), frequently taken on set-lines and in shrimp traps in fairly deep water; presumably they frequent rocky bottom since the apex is usually worn, especially in larger (older) shells; occasionally they have been found at low tide, probably when they have come in to spawn (3815,p59)
Repro: Egg case description, larvae description (3815,p60)

Family: Muricidae

Boreotrophon beringi (Dall, 1902)
Dist: 48-71°N (2551) (5591)
Note: Trophon goes to Boreotrophon

Boreotrophon dalli (Kobelt, 1878)
Dist: 48-72°N (2551) (5591)

Boreotrophon disparilis (Dall, 1891)
Dist: 33-48°N (2551), 33-54°N (5591)

Boreotrophon macouni (Dall, 1919)
Dist: 48-58°N (2551) (5591)

Boreotrophon multicostatus Eschscholtz, 1829
Dist: 34-60°N (2551) (5591)

Boreotrophon orpheus (Gould, 1849)
Dist: 46-48°N (2551) (5591)

Boreotrophon pacificus (Dall, 1902)
Dist: 17-72°N (2551) (5591)

Boreotrophon smithi (Dall, 1902)
Dist: 34-57°N (2551) (5591)

Boreotrophon staphylinus (Dall, 1902)
Dist: 33-55°N (2551), 32-57°N (5591)

Boreotrophon stuarti (Smith, 1880)
Dist: 33-55°N (2551), 33-60°N (5591)
Coll: Oregon, 46-106m (3003,p14)

Boreotrophon tenuisculptus (Carpenter, 1866)
Dist: 32-60°N (2551) (5591)

Ceratostoma foliata (Gmelin 1790) - (3815,p69)
Purpura foliata
Dist: Sitka, Alaska to San Diego, Calif. (3815,p70), 33-60°N (5591)
Coll: Ore: Coos Bay region (2385,p13); central Calif. coast (2033,p263)

Ceratostoma foliata (Gmelin 1790) - continued
Hab: Rocky beaches, dredged to 35 fms (3815, p70)
Repro: Yellow lily-shaped egg cases are frequently deposited on animal's own shell; each capsule contains about 25 eggs (3815, p70)

Ocenebra atropurpurea Dall, 1919
Dist: 32-50°N (5591)

Ocenebra barbarensis Gabb, 1866
Dist: 32-50°N (5591)

Ocenebra circumtexta (Stearns, 1871) - (2033, p263)
Coll: Central Calif. coast, intertidal (2033, p263)

Ocenebra gracillima (Stearns, 1871) - (2033, p263)
Coll: Central Calif. coast, intertidal (2033, p263)

Ocenebra interfossa (Carpenter, 1864)
Dist: Alaska to Lower Calif. (3815, p72), 32-60°N (5591)
Coll: Ore: Coos Bay region (2385); central Calif. coast (2033, p263)
Hab: Intertidal (2033, p263), common on rocky beaches at low-tide levels and to moderate depths (3815, p72)

Ocenebra japonica (Dunker, 1860)
Dist: Japan and North China; B. C. (3815, p73)
Coll: B. C.: Ladysmith Harbour, Boundary Bay, Comox, Crofton, Thetis Island, and Sooke (3815, p73)
Hab: Rocky beaches, esp. on oyster beds (3815, p73)
Note: Introduced from Japan (3815, p73)
Repro: Doesn't have a pelagic larva, it has not spread of its own accord (3815, p73)

Ocenebra lurida (Middendorff, 1849) - (2033, p263)
Dist: Alaska to Calif. (3815, p71), 34-60°N (5591)
Coll: Ore: Coos Bay region (2385); central Calif. coast (2033, p263)
Hab: Intertidal (2033, p263), rocky beaches at low-tide level (3815, p71)

MOLLUSCA - GASTROPODA - Muricidae

Tritonalia alpha
Dist: 40-48°N (2551)

Tritonalia aspera Baird, 1863
Dist: 34-57°N (2551)

Tritonalia fraseri Oldroyd, 1920
Dist: 49°N (2551)

Tritonalia michaeli Ford, 1888
Dist: 23-48°N (2551)

Tritonalia munda Carpenter, 1864
Dist: 33-59°N (2551)

Tritonalia painei Dall, 1903
Dist: 33-55°N (2551)

Tritonalia sclera Dall, 1919
Dist: 34-47°N (2551)

Trophonopsis tripherus (Dall, 1902)
Dist: 31-48°N (2551), 32-48°N (5591)

Urosalpinx cinereus (Say, 1822) - (2033, p262)
Urosalpinx cinerea - (3815, p74)
Dist: Atlantic Coast, Nova Scotia to Florida; B. C. (3815, p74)
Coll: B. C.: Boundary Bay (3815, p74); central Calif. coast (2033, p262)
Hab: Intertidal (2033, p262), intertidal and down to 4-5 fms (3815, p74)
Note: Introduced to B. C. from Atlantic Coast; numbers have decreased, so less serious pest than Japanese drill (3815, p74)
Repro: Move inshore to spawn, capsules contain 8-12 eggs (3815, p74)

Family: Thaisidae

Acanthina spirata (Blainville, 1832) - (2033,p263)
Dist: 19-48°N (2551), 17-49°N (5591)
Coll: Central Calif. coast, intertidal (2033,p263)

Thais canaliculata (Duclos, 1832) - (2551) (2385)
Dist: 37-57°N (2551) (5591), Aleutians to Calif. (3815,p79)
Coll: Ore: Coos Bay region, frequents entire littoral region, mostly in mussel beds and on barnacle-covered rocks (2385,pl4); central Calif. coast (2033,p263)

Thais cymica Dall, 1915 - (2385,pl3)
Dist: 38-48°N (2551)
Coll: Ore: Coos Bay region; found throughout littoral region; most characteristic habitat among barnacle-covered rocks (2385,pl3)

Thais emarginata (Deshayes, 1839)
Dist: 16-58°N (2551), Bering Sea to Mexico (3815,p77)
Coll: Ore: Coos Bay region (2385,pl3); central Calif. coast (2033,p263)
Hab: Intertidal (2033,p263); under rocks or in tide pools, wave beat zone (2031,p265), in Mytilus californianus community succession (2233,p246), rocky beaches but not in protected inlets (3815,p77), found on mussel-covered rocks and on more exposed rocks, can endure severe environmental changes (2385,pl3)

Thais lamellosa (Gmelin, 1792)
Dist: 34-65°N (2551), Bering Strait to Calif. (3815,p76)
Coll: B. C. (3804,pl26) (3815,p76); Ore: Coos Bay region (2385,pl3); central Calif. coast (2033,p263)
Hab: Distributed throughout littoral region, most characteristic habitat is among barnacle-covered rocks (2385,pl3), intertidal (2033,p263), barnacle strewn rocks or tide pools (2031,p263), sheltered rocky shores (3805,pl26), rocky beaches, in both sheltered and exposed locations (3815,p76)
Food: Young ascidians, oysters, barnacles, own eggs (2031,p263), barnacles, clams and other molluscs (3804,pl26)
Repro: Egg capsules attached to some solid support (3804,pl26) (3815,p76), breed in winter (in B. C.), congregate then at low-tide level (3815,p76)
Monograph on local clines and races (3427)

Thais lima (Martyn, 1784) - (2551)
Dist: 28-66°N (2551), Arctic Ocean to Lower Calif.; Japan (3815, p78)
Coll: Ore: Coos Bay region
Hab: Occurs on mussel beds and higher exposed rocks (2385, p14), rocky beaches at low-tide levels and into deeper water (3815, p78)

Thais ostrina Gould, 1852 - (2551)
Dist: 31-61°N (2551); Oregon to Calif. (2026)

Turbonilla eschscholtzi Dall and Bartsch 1907
Dist: 48-55°N (2551), Forrester Island, Alaska to Puget Sound (3815, p62)
Hab: More often dredged, but it has been taken at low tide on a reef near Sechelt Narrows, B. C. (3815, p62)

Family: Buccinidae

Buccinum diplodetum Dall, 1907
Dist: 47-55°N (2551), 47-57°N (2551)

Buccinum fucanum Dall, 1907
Dist: 44-48°N (2551)

Buccinum glaciale Linnaeus, 1761
Dist: 48-72°N (2551) (5591)

Buccinum oedematum Dall, 1907
Dist: 47-55°N (2551)

Buccinum strigillatum (Dall, 1891)
Dist: 29-48°N (2551)
Coll: Oregon, 50-347m (3003, p15)

Buccinum tenue Gray, 1839
Dist: 48-72°N (2551)

Volutharpa ampullacea Middendorff, 1848
Dist: 48-66°N (2551) (5591)

Family: Neptuneidae

Ancistrolepis californicus Dall, 1919
Dist: 33-48°N (2551), 32-51°N (5591)

Ancistrolepis eucosmius Dall, 1891
Dist: 45-57°N (2551), 44-57°N (5591)

Beringius undatus Dall, 1919
Dist: 49-55°N (2551) (5591)

Chrysodomus tabulatus Baird - (2031)
See *Neptunea tabulata*

Colus adonis Dall, 1919
Dist: 33-48°N (2551), 33-50°N (5591)

Colus aphelus Dall, 1889
Dist: 33-56°N (2551), 32-57°N (5591)

Colus dimidiatus Dall, 1919
Dist: 46°N (2551)

Colus errones Dall, 1919
Dist: 48-56°N (2551) (5591)

Colus georgianus Dall, 1919
Dist: 50°N (2551), 32-49°N (5591)

Colus halidonus Dall, 1919
Dist: 37-56°N (2551), 32-56°N (5591)

Colus halimeris Dall, 1919
Dist: 33-49°N (2551), 33-54°N (5591)

Colus halli Dall, 1873
Dist: 33-60°N (2551), 32-60°N (5591)

Colus jordani Dall, 1913
Dist: 37-60°N (2551), 32-60°N (5591)

Colus roseus (Dall, 1877)
Coll: Oregon, 147-174m (3003,pl5)

Colus severinus (Dall, 1919)
Dist: 31-51°N (5591)
Coll: Oregon, 200-360m (3003,pl5)

Colus spitsbergensis Reeve, 1855
Dist: 48-72°N (2551) (5591)

Colus tahwitanus Dall, 1918
Dist: 48°N (2551), 48-49°N (5591)

Colus trophius Dall, 1919
Dist: 34-56°N (2551)

Exilioidea rectirostris Carpenter, 1865
Dist: 30-56°N (2551), 30-60°N (5591)

Mohnia vernalis Dall, 1913
Dist: 37-46°N (2551), 36-52°N (5591)

Neptunea amianta (Dall, 1890) - (2587,pl19)
Dist: 34-56°N (2551) (5591)
Hab: 400-1000 fms (2587,pl19)

Neptunea lirata (Gmelin, 1791) - (2587,pl19);(Martyn, 1784) - (3003,pl5)
Dist: 32-71°N (5591), 37-71°N (2551), S-E Alaska to B. C. (2587,pl19)
Coll: Oregon, 126-1426m (3003,pl5)

Neptunea phoenicea (Dall, 1891)
Dist: 45-55°N (2551), 45-56°N (5591)
Coll: B. C. and Puget Sound (2587,pl19)

Neptunea pribiloffensis (Dall, 1919) - (2587,pl19)
Dist: Gulf of Alaska to B. C. (2587,pl19), 48-60°N (5591)

Neptunea smirnia (Dall, 1919)
Dist: 48-60°N (2551) (5591)
Coll: Calif: Humboldt Bay (2587,pl19)

Neptunea stilesi A. G. Smith
Dist: Cape Scott, B. C. to Cape Flattery, Wash. (2587,pl17)
Hab: Apparently lives on fairly soft mud bottom (2587,pl19)
Note: Comparison with other Neptunea by range and shell characteristics (2587,pl19)

Neptunea tabulata (Baird, 1863) - (2551) (2385,pl5)
Chrysodomus tabulatus
Dist: 33-51°N (2551), 33-54°N (5591).
Coll: Ore: One empty shell collected on Bassendorf Beach, Coos Bay region (2385,pl5)

Plicifusus griseus Dall, 1890
Dist: 33-60°N (2551), 32-60°N (5591)

Plicifus laticordatus Dall, 1907
Dist: 48-60°N (5591) (2251)

Searlesi dira (Reeve, 1846)
Dist: 37-56°N (2551), Alaska to Calif. (3815,p64), 37-56°N (5591)
Coll: B. C.: Common along coast (3815,p64); Wash: Puget Sound (2031,p257); Ore: Coos Bay region (2385,pl5); central Calif. coast (2033,p262)
Hab: Intertidal (2033,p262), rocky beaches at low-tide level and below (3815,p64), sometimes taken in deep water in shrimp traps and on set-lines (3815,p64), found in mid- and lower-littoral region, often encrusted with coralline algae (2385,pl5)

Family: Columbellidae

Amphissa columbiana (Dall, 1916)
Dist: 34-56°N (2551), Alaska to Calif. (3815,p80)
Coll: Ore: Coos Bay region (2385,pl5)

Amphissa columbiana (Dall, 1916)- continued
Hab: Found among algae-covered rocks and underneath these rocks in sand (2385,p15), rocky beaches at low tide, mud bottom in 16 fms off Calif. (3815,p80)

Amphissa reticulata Dall, 1916
Dist: 33-58°N (2551), 32-60°N (5591)

Amphissa versicolor (Dall, 1871)
Dist: 28-44°N (2551), 28-54°N (5591)
Coll: Ore: 25-146m (3003,p14); central Calif. coast (2033,p262)
Hab: Intertidal (2033,p262) in climatic biotic *Mytilus californianus* community (2233,p246)

Mitrella carinata (Hinds, 1844)
Dist: 23-60°N (5591)
Coll: Central Calif. coast, intertidal (2033,p262)

Mitrella gausapata (Gould, 1850)
Dist: 27-60°N (2551), Alaska to San Diego, Calif. (3815,p82)
Coll: Ore: Coos Bay region (2385,p14)
Hab: Empty shells found in sand beneath rocks west of shell beach at North Bay, Oregon (2385,p14); around roots of eel grass or on algae-covered rocks, dredged from 5 fms at Ladysmith, B. C. (3815,p82)

Mitrella gouldii Carpenter, 1856
Dist: 24-55°N (2551) (5591)

Mitrella hypodra Dall, 1916 - (2551)
Dist: 14-48°N (2551) (5591)

Mitrella luculenta Dall, 1919
Dist: 33-48°N (2551), 38-48°N (5591)

Mitrella permodesta Dall, 1890
Dist: 33-55°N (2551) (5591)

Mitrella tuberosa Carpenter, 1865
Dist: 23-55°N (2551) (5591)

Family: Nassariidae

Nassarius californianus
N. rhinetes
Schizopyga californiana (Conrad, 1856)
Dist: 25-43°N (2551)
Coll: Ore: empty shells found in Coos Bay region (2385,p14)

Nassarius cooperi (Forbes, 1850)
Dist: 33-48°N (2551)
Coll: Central Calif. coast (2033,p262)
Hab: Intertidal (2033,p262)

Nassarius fossatus (Gould, 1849)
Schizopyga fossatus
Dist: 27-49°N (2551), Queen Charlotte Islands to Lower Calif. (3815,p66)
Coll: Oregon, 25-68m (3003,p14), empty shells in Coos Bay region; Calif: central coast (2033,p262), Samoa (2686,p39)
Hab: Intertidal (2033,p262), concentrated at 7 fms (2686,p39), around or under rocks in sand or mud at low tide, dredged off Calif. (3815,p66)
Feeding: Burrows in search of prey, with siphon above surface, wraps foot around food until devoured (3815,p66)
Repro: Egg laying process (3815,p66)

Nassarius indisputabilis (Oldroyd)
Dist: 34-48°N (2551)

Nassarius mendicus (Gould, 1849)
Schizopyga mendicus
Dist: 25-55°N (2551), Alaska to Lower Calif. (3815,p67), 25-60°N (5591)
Coll: Ore: 73-146m (3003,p15), Coos Bay (2385); Calif. (2033)
Hab: Intertidal (2033,p262), rocky beaches at low tide, has been dredged to 10 fms, also taken from deeper water in shrimp traps and on set-lines (3815,p67); brought up by fishermen in otter trawl (2385,p16)

Nassarius obsoletus (Say, 1822)
Dist: 38-54°N (5591), B. C. to Calif; Nova Scotia to Fla. (3815,p68)
Coll: Central Calif. coast (2033,p262)
Hab: Intertidal (2033,p262), mud flats, often where water is brackish (3815,p68)

Nassarius obsoletus (Say, 1822) - continued
Repro: Egg capsules laid on eel grass in spring, inside moon snail collar, or on an old bivalve shell; many deposited together; each capsule attached by short stalk (3815,p68)
Note: Introduced with oyster spat from east coast (3815,p68)

Nassarius perpinquis (Hinds, 1844)
Dist: 28-48°N (2551), 25-54°N (5591)
Coll: Ore: Coos Bay region (empty shells) (2385,p14); intertidal on Central California coast (2033,p262)

Family: Fusinidae

Fusinus barbarensis Trash, 1885
Dist: 33-44°N (2551)

Fusinus harfordii Stearns, 1871
Dist: 41°N (2551), 39-51°N (5591)

Fusinus luteopictus (Dall, 1877)
Coll: Central Calif. coast, intertidal (2033,p262)

Family: Mitridae

Mitra catalinae Dall, 1919
Dist: 33-42°N (2551), Crescent City, Calif. to San Diego (2026)

Volutomitra alaskana Dall, 1902
Dist: 33-57°N (2551)

Family: Marginallidae

Cypraeolina pyriformis (Carpenter, 1865) - (2033,p262)
Dist: 23-58°N (2551), Alaska to Gulf of Calif. (3815,p85)
Coll: Central Calif. coast, intertidal (2033,p262)

Cypraeolina pyriformis (Carpenter, 1865) - continued
Hab: At low-tide level to depth of 40 fms; on mud or gravel, in rock crevices, on backs of larger shells, and occasionally on kelp (3815, p85)

Family: Olividae

Admete californica Dall, 1908
Dist: 23-45°N (2551)

Admete couthouyi Jay, 1839
Dist: 33-72°N (2551) (5591)

Admete gracilior Carpenter, 1866
Dist: 33-71°N (2551), 32-72°N (5591)

Admete laevior Locke, 1878
Dist: 47-72°N (2551) (5591)

Cancellaria modesta Carpenter, 1865
Dist: 48-56°N (2551), 48-60°N (5591)

Cancellaria unalaskensis Dall, 1873
Dist: 43-55°N (2551) (5591)

Olivella baetica (Carpenter, 1863) - (2551)
Dist: 23-57°N (2551), Alaska to Lower Calif. (3815, p84), 23-60°N (5591)
Coll: Central Calif. coast, intertidal (2033, p262)
Hab: Sandy beaches and sometimes from deeper water, off B. C. at 34 fms, 25 fms, 10 fms (3815, p84)
Note: Found in starfish stomachs (3815, p84)

Olivella biplicata (Sowerby, 1825)
Dist: 25-49°N (2551), Sitka, Alaska to Lower Calif. (3815, p83), 25-54°N (5591)
Coll: Ore: 22-100m (3003, p14), Coos Bay, found during very low tides partly buried in sand (2385, p15); Calif: central coast (2033, p262), Clam Beach (2686, p32)

Olivella biplicata - continued

Hab: Intertidal (2033,p262) (2686,p32), sandy beaches (3815,p83), intertidal sand flats of exposed stretches of coast, and in protected areas of harbors, bays, estuaries (3785,p259)

Habits: Remains dormant during low tide, becomes active with return of waves (3785,p259), distribution by external agents (waves, currents) as well as active moving (3785,p259)

Life Cycle: Veliger to sexually mature stage: 3-5 years; life expectancy: 8-12 years (3785,p255)

Repro: (3800,p297) (3801), throughout the year (2785,p259)

Predators: Octopus, Conus californieus, Polinices recluzianus, Pisaster brevispinus, Astropecten armatus, crabs, shore birds, man; predator techniques (3787,p326), although variety of predators, population effects lessened (1) by species specific avoidance responses (3787,p329) (2) by adults burying themselves in bright light thus avoiding visual predators (3787,p331) (3) by variations in predator distribution and predator food choice (3787,p331); more important mortality factors include (1) parasitic trematodes (2) fresh water flooding, silting (3787,p331)

Olivella predroana Conrad, 1855

Dist: 23-55°N (2551) (5591)

Olivella pycna Berry, 1935 - (2033,p262)

Coll: Calif: central coast (2033,p262), Samoa (2686,p39)

Hab: Intertidal (2033,p262); non-intertidal: concentrated at 7 fms (2686,p39)

Family: Conidae

Conus californicus (Hinds, 1844) - (2033,p262)

Dist: 26-38°N (2551)

Coll: Central Calif. coast, intertidal (2033,p262)

Feeding: Vermivore (2589,p163)

Family: Turridae

Clathurella canfieldi (Dall, 1871)

Philbertia canfieldi

Dist: 33-41°N (2551)

MOLLUSCA - GASTROPODA - Turridae

Cryptogemma pernodata Dall, 1908
Dist: 16-46°N (2551)

Cryptogemma polycaste Dall, 1919
Dist: 23-45°N (2551)

Mangelia victoriana
Cytharelia victoriana Dall, 1897
Dist: 48°N (2551)

Pleurotomella thalassica Dall, 1919
Dist: 45°N (2551)

Pseudomelatoma torosa (Carpenter, 1865)
Dist: 27-40°N (2551)
Coll: Central Calif. coast, intertidal (2033, p262)

Taranis strongi Arnold, 1903
Dist: 33-55°N (2551) (5591)

Family: Borosiinae

Lora alaskensis Dall, 1871
Dist: 48-66°N (2551) (5591)

Lora babylonia Dall, 1919
Dist: 45°N (2551)

Lora colpoica Dall, 1919
Dist: 46°N (2551)

Lora exarata Möller, 1842
Dist: 37-72°N (2551)

Lora excurvata Carpenter, 1865
Dist: 48-56°N (2551)

Lora fidicula Gould, 1849
Dist: 49-55°N (2551), 48-56°N (5591)

MOLLUSCA - GASTROPODA - Borosiinae

Lora harpularia Couthouy, 1838
Dist: 48-72°N (2551)

Lora lotta Dall, 1919
Dist: 33-55°N (2551), 33-54°N (5591)

Lora maurellei Dall and Bartsch, 1910
Dist: 48°N (2551)

Lora miona Dall, 1919
Dist: 38-55°N (2551), 35-55°N (5591)

Lora pleurotomaria Couthouy, 1838
Dist: 48-60°N (2551)

Lora popovia Dall, 1919
Dist: 37-57°N (2551) (5591)

Lora pribilova Dall, 1919
Dist: 37-71°N (2551)

Lora quadra Dall, 1919
Dist: 48-56°N (2551), 43-56°N (5591)

Lora rosea Loven, 1846
Dist: 48-56°N (2551), 48-57°N (5591)

Lora solida Dall, 1886
Dist: 48-63°N (2551) (5591)

Lora tabulata Carpenter, 1865
Dist: 37-57°N (2551), 36-57°N (5591)

Lora turricula Montagu, 1803 - (2551)
Dist: 48-72°N (2551) (5591)

Mitromorpha gracilior Hemphill, 1884
Dist: 30-55°N (2551), 32-55°N (5591)

Family: Cochlespirinae

Aforia circinata Dall, 1873
Dist: 48-62°N (2551) (5591)

Antiplanes abarbarea (Dall, 1919)
Coll: Oregon, 128-512m (3003,pl5)

Antiplanes litus Dall, 1919
Dist: 35-47°N (2551), 35-49°N (591)

Antiplanes perversa (Gabb, 1865)
Dist: 30-55°N (2551), 29-57°N (5591)
Coll: Oregon, 50-245m (3003,pl5), one empty shell found from South Slough, Coos Bay region (2385,pl6)

Antiplanes rotula (Dall, 1919)
Dist: 33-55°N (2551)
Coll: Oregon: Empty shell brought up in otter trawl off Coos Bay (2385,pl6)

Antiplanes thalaea Dall, 1902
Dist: 33-54°N (2551), 32-55°N (5591)

Antiplanes vinosa (Dall, 1874)
Dist: 33-59°N (2551)
Coll: Oregon, 146-1250m (3003,pl5)

Leucosyrinx blanca Dall, 1919
Dist: 43°N (2551)

Leucosyrinx leonis Dall, 1908
Dist: 33-47°N (2551)

Family: **Mangeliinae**

Clathrodrillia fancherae Dall, 1903
  Clathrodillia halcyonis (5591) Synonym
    Dist: 33-49°N (2551), 27° to 49° (5591)

Clathrodrillia incisa Carpenter, 1865
    Dist: 33-48°N (2551), 32° to 45° N (5591)

Clathrodrillia rhines Dall, 1908
    Dist: 33-48°N (2551), 32° to 48°N (5591)

Mangelia aleutica Dall, 1871
    Dist: 48-72°N (2551); (5591)

Mangelia arteaga Dall and Bartsch, 1910
    Dist: 33-48°N (2551), 33° to 49° (5591)

Mangelia barbarensis Oldroyd, 1924
    Dist: 23-48°N (2551); (5591)

Mangelia hecetae Dall and Bartsch, 1910
    Dist: 33-48°N (2551), 33° to 49°N (5591)

Mangelia interfossa Carpenter, 1865
    Dist: 33-49°N (2551)

Mangelia levidensis Carpenter, 1865
    Dist 37-63°N (2551); (5591)

Mangelia newcombei Dall, 1919
    Dist: 38-48°N (2551), 38° to 49°N (5591)

Mangelia sculpturata Dall, 1886
    Dist: 33-57°N (2551)

Subclass: OPISTHOBRANCHIA
Family: Bullidae

Volvulella cylindrica (Carpenter, 1863) (2550, p62)
Dist: Vancouver Island south to Gulf of California (2550, p62); (2580), 23-48°N (2551), 32° to 54°N (5591)

Family: Atgidae

Haminoea olgae (Dall, 1919), (2550 p 63)
Dist: Olga, Washington, to San Quentin, Bay, Lower California (2550 p63), 30-60°N (2551)

Haminoea solitaire (2031 p251)
Hab: Mud-just below surface (2031 p251)

Haminoea vesicula (Gould, 1855)
Dist: Vancouver Island to Gulf of California (2550 p63), Alaska to Gulf of California (3793 p427); (3815 p90), 36-57°N (5591)
Coll: Central California coast (2033 p268), Puget Sound (2550 p63)
Hab: Intertidal (2033 p268); mossy rocks. tide pools. eel grass (2031 p 251), "Muddy bays, amongst eelgrass, in sandy or gravelly patches between rocks. Sometimes where water is brackish." (3815 p90)
Feeding: Partially vegetarian, also eats small crustaceans and molluscs. (3815 p91)
Repro: eggs laid on eelgrass (3815 p91)
Notes: Secretes mucus to keep moist when exposed (3815 p91)

Family: Retusidae

Retusa harpa Dall, 1871 (2550 p61)
Dist: Queen Charlotte Islands, B. C. to San Diego, California (2550 p61), 30-55°N (2551)

Family: Philinidae

Philine polaris Aurivillius, 1885
Dist: 48-72°N (2551) 49-70°N (5591)

Family: Aglijidae

Aglaja adellae Dall, 1894 - (2550, p64)
Dist: Eagle Harbor, Puget Sound in 20 fathoms. (2550, p64)
48°N (2551)

Aglaja diomedea (Bergh, 1894)- (2033, p268)
Coll: Central Calif. coast (2033, p268); 38-60°N (5591)
Hab: Intertidal (2033, p268)

Aglaja ocelligera (Bergh, 1894)
Dist: Alaska to Santa Barbara, Calif. (3793, p425)
Rare.

Family: Gastropteron

Gastropteron pacificum Bergh, 1893
Dist: 48-56°N (2551), 48-60°N (5591)

Family: Pyramidellidae

Iselica fenestrata Carpenter, 1864
Dist: 23-48°N (2551), 23-53°N (5591)

Iselica laxa Dall, 1919 - (2551)
I. Obtusa - 33-48°N (2551)
Dist: 48°N (2551), 48-52°N (5591)
Hab: Shallow water on weeds and other shells; once found attached to little neck clam Protothaca staminea (3815, p43)

MOLLUSCA - OPISTHOBRANCHIA - Pyramidellidae

Odostomia angularis Dall and Bartsch, 1947
Dist: 35-57°N (2551), 38-57°N (5591)

Odostomia avellana Carpenter, 1865
Dist: 48°N (2551)
Coll: Neah Bay, Wash. (5591)

Odostomia barkleyenis Dall and Bartsch, 1910
Dist: 48°N (2551); (5591)

Odostomia canfieldi Dall, 1908
Dist: 33-48°N (2551), 38-50°N (5591)

Odostomia columbiana Dall and Bartsch, 1907
Dist: 48-55°N (2551), 49-50°N (5591)

Odostomia deliciosa (Dall and Bartsch, 1907) - (2385, pl2)
Dist: 37-49°N (2551), 38-52°N (5591)
Coll: Coos Bay region. Found from lower sides of rocks, inhabit lower littoral region. (2385, pl2)

Odostomia edmondi Jordan, 1920
Dist: 41°N (2551)

Odostomia engbergi Bartsch, 1920
Dist: 48°N (2551); (5591)

Odostomia euglypta Jordan, 1921
Dist: 41°N (2551)

Odostomia gouldii Carpenter, 1865
Dist: 33-48°N (2551)

Odostomia grippiana Bartsch, 1912
Dist: 49-56°N (2551)

Odostomia inflata (Carpenter, 1864)
Dist: 37-48°N (2551)

Odostomia kennerleyi Dall and Bartsch, 1907
Dist: 37-49°N (2551)

Odostomia nuciformis Carpenter, 1865
Dist: 48°N (2551)

Odostomia oregonensis Dall and Bartsch, 1907
Dist: 37-55°N (2551), 36-54°N (5591)

Odostomia quadrae Dall and Bartsch, 1910
Dist: 48-60°N (2551), Cook Inlet, Alaska to Puget Sound (3815, p61)
Hab: "On polyps or sponges, and amongst worm cases at low tide." (3815, p61)
Feeding: Probably parasitic. Have been collected from variety of hosts including *Hinnites multirugosus.* (3815, p61)

Odostomia sanjuanensis Bartsch, 1920
Dist: 48°N (2551), 44-50°N (5591)

Odostomia satura Carpenter, 1865
Dist: 48°N (2551)

Odostomia skidegatensis Bartsch, 1912
Dist: 41-60°N (2551), 32-54°N (5591)

Odostomia spreadboroughi Dall and Bartsch, 1910
Dist: 48°N (2551)

Odostomia stephensae Dall and Bartsch, 1909
Dist: 48-60°N (2551), 50-60°N (5591)

Odostomia tacomaensis Dall and Bartsch, 1907
Dist: 48°N (2551)

Odostomia talpa Dall and Bartsch, 1909
Dist: 48-60°N (2551)

Odostomia tenuisculpta Carpenter, 1864
Dist: 24-48°N (2551), 30-52°N (5591)

Odostomia valdezi Dall and Bartsch, 1907
Dist: 33-48°N (2551)

MOLLUSCA - OPISTHOBRANCHIA - Pyramidellidae

Odostomia vancouverensis Dall and Bartsch, 1910
Dist: 48-55°N (2551)

Odostomia washingtonia Bartsch, 1920
Dist: 48°N (2551)

Odostomia youngi Dall and Bartsch, 1912
Dist: 48°N (2551)

Turbonilla alaskana Dall and Bartsch, 1909
Dist: 48-58°N (2551)

Turbonilla aurantia Carpenter, 1865
Range: 48-49°N (2551), 32-50°N (5591)

Turbonilla barkleyensis Bartsch, 1917
Dist: 49°N (2551)

Turbonilla engbergi Bartsch, 1920
Dist: 48°N (2551)

Turbonilla kincaidi Bartsch, 1921
Dist: 48°N (2551), 48-50°N (5591)

Turbonilla lordi Smith, 1880
Dist: 49-57°N (2551)

Turbonilla macouni Dall and Bartsch, 1910
Dist: 49°N (2551)

Turbonilla newcombei Dall and Bartsch, 1907
Dist: 48-55°N (2551), 49-51°N (5591)

Turbonilla oregonensis Dall and Bartsch, 1907
Dist: 45-47°N (2551), 43-50°N (5591)

Turbonilla pedroana Dall and Bartsch, 1903
Dist: 33-48°N (2551), 36-49°N (5591)

Turbonilla pesa Dall and Bartsch, 1910
Dist: 49°N (2551)

Turbonilla pugetensis Bartsch, 1917
Dist: 48°N (2551) 47-49°N (5591)

Turbonilla rinella Dall and Bartsch, 1910
Dist: 49°N (2551)

Turbonilla taylori Dall and Bartsch, 1907
Dist: 48-55°N (2551), 49-50°N (5591)

Turbonilla valdezi Dall and Bartsch, 1907
Dist: 37-49°N (2551), 36-50°N (5591)

Turbonilla vancouverensis Baird, 1863
Dist: 37-60°N (2551), 49-60°N (5591)

Turbonilla victoriana Dall and Bartsch, 1907
Dist: 49°N (2551)

Family: Scaphandriadae

Acteocina culcitella Gould, 1853
Dist: 33-58°N (2551), Kodiak Island, Alaska to Calif. (3815, p86)
38-57°N (5591)
Hab: "On rocks at low-tide level." Dredged at 8 fms in B. C.
(3815, p86)

Acteocina eximia Baird, 1863
Dist: 37-58°N (2551)
Hab: "More often dredged but found occasionally on the beach
at low tide." (3815, p87)

Acteocina inculta Gould, 1856
Dist: 33-37°N (2551)

Acteocina oldroydi (Dall, 1928)
Dist: 49°N (2551)

Cylichna alba Brown, 1927
Dist: 37-71°N (2551), 38-60°N (5591)

MOLLUSCA - OPISTHOBRANCHIA - Scaphandriadae

Cylichna attonsa (Carpenter, 1865)
Dist: B. C. to Calif. (3815, p89), 32-50°N (5591)
Hab: (3815, p89) . . . "deep-water species, but it is occasionally found on rocks where the water is very cold."

Family: Acteonidae

Actaeon punctocoelata (Carpenter, 1864)
Dist: B. C. to California (3815, p88)
Coll: Central Calif. coast (2033, p268)
Hab: Intertidal (2033, p268) "Usually below low-tide level, but sometimes in tide pools and amongst the eelgrass at low water apparently when it comes in to spawn. Large numbers were seen quite low on a more or less sandy beach in the mouth of Sechelt Inlet (B. C.) in May.: (3815, p88)

Family: Ringigulidae

Microglyphis estuarinus (Dall, 1908)
Dist: 23-48°N (2551), 38-49°N (5591); Straits of Juan de Fuca to Calif. (2550, p60)

Family: Pleurobranchidae

Pleurobranchus californicus (Dall, 1900)
Coll: Central Calif. coast (2033, p268)
Hab: Intertidal (2033, p268)

Family: Aplysiidae

Phyllaplysia zostericola McCauley, 1960
Phyllaplysia taylori Dall, 1900 - (2033, p268)
Dist: San Juan Islands to San Diego Bay. (3793, p428)
32-50°N (5591)

Family: Hermaeidae

Hermaea vancouverensis (O'Donoghue, 1924) - (2752, p36); (3803)
Dist: Vancouver Is. B. C. (2752, p36); (5591)
Coll: Vancouver Island (3803); (2278, p240), Coos Bay region (2752, p36)
Hab: 2' above mean low water level (2752, p36), base of Zostera marina below low tide level. (3903, p21), low tide (2278, p340)

Hermaeina smithi Marcus, 1961 - (3793)
Dist: San Juan Islands to San Diego (3793, p427), frequent.

Family: Elysiidae

Elysia hedgpethi (Marcus, 1961)
Dist: San Juan Islands to La Jolla; (inferred) Bahia de Los Angeles (3793, p429)

Family: Cavolinidae

Cavolina occidentalis (Dall, 1908)
Dist: Northeast Pacific, 30-54°N (2550, p59); (5591)

Cavolina uncinata (Rang) - (2341)
Coll: Oregon (2341)

Clio balantium (Rang) - (2341)
Coll: Oregon (2341)

Cavolina tricuspida (Rivers, 1904) - (2551)
Dist: 30-54°N (2551)

Clio exacuta Gould, 1852 - (2550, p59); (2551)
Dist: 46°N (2551)
Coll: N. Pacific Ocean west of Columbia River. (2550, p59)

Clio occidentalis (Dall, 1871) - (2550, p59); (2551)
Dist: Northeast Pacific 30-50°N. Off the Farallone Islands in the stomach of Orthagoriscus mola. (2550, p59); (2551)

Creseis subula (Quoy and Gaimard, 1827)
Dist: Warmer waters of the north Pacific (2550, p59)

Styliola falcata (Gould, 1852)
Dist: Northeast Pacific, West of Oregon (2550, p59)

Family: Clionidae

Caranaria japonica Dall, 1919
Coll: Oregon (2341)

Clione limacina (Phipps, 1773) - (2341)
Clione kincadi Agersborg - Synonym (5591)
Dist: Bering Sea to Pribilof Islands (2550, p59)
37-77°N (5591)
Coll: Oregon (2341)
Hab: Pelagic

Family: Cymbaliidae

Corolla spectabilis (Dall, 1871)
Coll: Oregon (2341); N. Pacific ocean to lat. 43°N (2550, p59)
36-55°N (5591)

Family: Pneumodermatidae

Pneumoderma pacifica (Dall, 1871) - (2550, p60); (2551)
Dist: Northeast Pacific, off California coast 37-45°N (2550, p60), 34-45°N (2551)

Family: Desmopteriidae

Desmopterus pacificus (Essenberg, 1919) - (2550, p60)
Dist: Off Southern California (2550, p60)

Family: Limacinidae

Limacina helacina (Phipps, 1774) - (2341)
Coll: B. C. (3807, p322-326), Ore: (2341)
Feeding: Gut contents: diatoms (*Skelatonema costatum*, *Chaetoceros* spp. and *Thalassiosira* spp.) but dinoflagellates (*Prorocentrum* sp., *Oxytoxum* sp., *Gymnodinium* sp., *Ceratium* sp., and *Tintinnids*) predominated. *Filter-feeder* (3807, p323)
Repro: Spawn descrip., egg development larva dev. (3807, p322-326). (includes drawings)
Temp: Maintained at 13°C for 24 days; day 25; (larva) 1/2 subjected to 18°C for 12 hours., the others to 4°C for 12 hrs. All survived, but metamorphosis was not initiated. After temp. change, no larval shell showed characteristic vertical striations. (3807, p326).

Family: Spiratellidae

Pterotrachea scututa (Gegenbaur) - (2341)
Coll: Ore: (2341)

MOLLUSCA - OPISTHOBRANCHIA - Spiratellidae

Spiratella pacifica Dall, 1871 - (2550, p58)
Dist: 37-72°N (2551), Point Barrow, Arctic Ocean, to Monterey, Calif. (2550, p58)

Family: Polyceridae

Aegires albopunctatus MacFarland, 1905 - (2033, p269)
Dist: Vancouver Island to Coronados Islands; Bahia de Los Angeles (3793, p425), 32-51°N (5591)
Coll: B. C.: Vancouver Island region (2277, p9), Calif: central coast (2033, p269); (2278, p237)
Hab: Intertidal (2033, p269), (2278, p237), common. Intertidal to 20' (3793, p425); 6-12 fathoms off gravel/mud bottom with seaweed (2277, p9)

Lialia cockerelli (MacFarland, 1905) - (2752, p29)
Dist: Vancouver Is., Monterey Bay, near Laguna, San Pedro. La Jolla (2752,p29), Vancouver Is. to Cape San Lucas, (3793,p427)
Coll: B. C.: Vancouver Is. (3803,p30); (2278,p238), Ore: Coos Bay region (2752,p29), Calif: Central coast (2033,p269)
Hab: Intertidal (2033,p269) under shelving rocks in tide pools along the coast, esp. near Pt. Aulon and Pt. Pinos; above *Zostera* zone in Vancouver Is. region (2752,p29) low tide (3803,p30); (2278,p238)

Polycera atra MacFarland, 1905 - (2033, p269)
Coll: Central Calif. coast (2033, p269); (2278, p238)
Hab: Intertidal (2033, p269), pools (2278, p238)

Polycera zosterae O'Donoghue, 1924 - (3803)
Coll: B. C.: Vancouver Island, (3803); (2278, p238)
Hab: Lower portions of *Zostera marina* (3803, p10) low tide (2278, p238)

Triopha maculata MacFarland, 1905 - (2033, p269)
Coll: Calif: central coast (2033, p269); (2275, p238)
Hab: Intertidal (2033, p269), pools (2278, p238)

MOLLUSCA - OPISTHOBRANCHIA - Polyceridae

Triopha grandis MacFarland, 1905 - (2033,p269)
Coll: Calif: Central coast (2033,p269); (2278,p238)
Hab: Intertidal (2033,2[illegible])

Triopha catalinae (Cooper, 1863) - (2033,p269)
Coll: Calif: Central coast (2033,p260); (2278,p238)
Hab: Intertidal (2033,p269); (2278,p238)

Triopha carpenteri (Stearns, 1873) - (2033,p269)
Dist: 32-53°N (5591), Vancouver Island to San Diego; Japan (3793,p428), Monterey Bay (2752,p28)
Coll: Ore: Coos Bay region (2752,p27); (2278,p238), Calif: Central coast (2033,p269)
Hab: Intertidal (2033,p269); almost always found adhering to Zostera or Laminaria in tide pools below fucoid zone (2752,p28), pools (2278,p238)
Misc: population ecology: (2752,p28)

Triopha aurantiaca (Cockerell, 1908) - (3803)
T. elioti
Dist: 30-50°N (5591), Monterey, California (2278,p237)
Coll: B. C.: Vancouver Isl. (3803,p24); (2278, p237)
Hab: Low tide (3803,p24,29). 10 fms (3803,p29); (2278,p237)

Family: Onchidoridinae

Acanthodoris armata O'Donoghue, 1927
Coll: B. C.: Vancouver Isl. region (2277,p4)
Hab: Reef attached to bryozoan Flustra lichenoides whose polyps furnish food. (2277,p5)

Acanthodoris atrogriseata O'Donoghue, 1927
Coll: B. C.: Vancouver Isl. (2277,p2)
Hab: Under stones on reef (2277,p3)

Acanthodoris brunnea MacFarland, 1905 - (2033,p269)
Coll: B. C.: Vancouver Isl. (3803,p269), Calif.: central coast (2033,p269)
Hab: Intertidal (2033,p269), 15 fms (3803); (5278), 5-10 fms Calif. (2278), under rocks (2031)

MOLLUSCA - OPISTHOBRANCHIA - Onchidoridinae

Acanthodoris columbina MacFarland, 1926 - (2033,p269)
Coll: Calif: Central coast (2033,p269)
Hab: Intertidal (2033,p269)

Acanthodoris hudsoni MacFarland, 1905 - (2033,p269)
Dist: 36-55°N (5591)
Coll: B. C.: Vancouver Isl. low tide (2278,p238)
Hab: Intertidal (2033,p269)

Acanthodoris nanaimoensis O'Donoghue, 1921
Dist: Vancouver Island to Shell Beach, Calif. (3793,p425)
RARE
Coll: Vancouver Island (2278,p238), low tide.

Onchidorus fusca (Muller, 1776)
Lamellidoris bilamellata
Dist: Bering Sea to Puget Sound (2752,p30)
Vancouver Island (3803,p24); (2278,p238)
Hab: At Squaw Isl. under rocks on a coarse sand beach, in dredge hauls from 2-5 fms inside Coos Bay, on rocks at Old Jetty in same habitat as Hermissenda sp. Fisherman's Wharf with Hermissenda crassicornis, Archidoris montereyensis, Mytilus edulis, Mitella polymera, Ulva, Obelia and other wharf inhabitants (2752,p30), low tide (2278,p238)
Misc: Population ecology (2752,p30)

Onchidoris hystricina (Bergh, 1878) - (3793)
Dist: Alaska to Pt. Loma, California (3793,p427) (common)
38-58°N (5591)
Coll: Alaska 10 fms (2278,p238)

Family: Corambidae

Corambe pacifica MacFarland and O'Donoghue, 1929 - (2033,p269)
Dist: Vancouver Island to San Diego (3793,p426), 27-53°N (5591)
Coll: Calif: Central coast (2033,p269)
Hab: Intertidal (2033,p269)

Corolla spectabilis Dall, 1871
Dist: 34-43°N (2551), 36-55°N (5591)

Family: Dorididae

Aldisa sanguinea (Cooper, 1862)
Dist: California (2752,p18)
Coll: Ore: Coos Bay region (2752,p18), Calif: San Diego, Santa Barbara, Monterey, Point Lobos (2752,p18) pools (2278,p237)
Hab: Intertidal (2033,p268)

Anisodoris nobilis (MacFarland, 1905)
Dist: 33-51°N (5591), Vancouver Island region to Monterey (2752,p16), (3803,p22, 28); Vancouver Island to Coronados Islands (3793,p425)
Coll: B. C.: Vancouver Island (2278,p237), Ore: Coos Bay region (2752,p16), Calif: central coast (2033,p268), Santa Barbara (3752,p220), (2278,p237)
Hab: Intertidal (2033,p268), rocky polls or on piles; intertidal to 840' off Santa Cruz Isl. (2752,p220); 25 fms (2752,p17); prefers protected outer coast--intertidal to 50' (3793,p425), pools (2278,p237)
Repro: (2752) spawn (3803,p22-23)

Archidoris montereyensis (Cooper, 1862)
Dist: Sitka, Alaska to La Jolla, California (2752,p14), Alaska to San Diego (3777,p91); (3793,p426)
Coll: B. C.: Vancouver Isl. (3803); (2278,p237), Ore: 100 m (3003,p15), Coos Bay (2746); (2752), Calif: Central Coast (2033,p268); (2278,p237)
Hab: Intertidal (2033,p268), low tide; 10 fms (3803,p28), One of the commonest nudibranchs on this coast; often associated with the sponge Halichondria. (2033,p. 268) intertidal to 840' off Santa Cruz Island (3752, p220), pools to 30 fms (2278,p237)
Feeding: Yellow sponges, non-encrusting algae, Halichondria and Ficulina (sponges) (2752,p14)
Repro: spawns: April - August (2752,p15), descrip. spawn: (3803,p22-23)
Misc: population ecology: (2752,p15)

Cadlina flavomaculata MacFarland, 1905 - (2033,p268)
Dist: Vancouver Island region, Monterey and La Jolla (2752,p19), Vancouver Island to Pt. Eugenia, Mexico (3793,p426), 27-54°N (5591)
Coll: B. C.: Vancouver Isl. (3803,p23); (2278,p237), Ore: Coos Bay region (2752,p19), Calif: Central coast (2033,p268)
Hab: Intertidal (2033,p268); inhabits rocky tide pools. Found at low tide and under rocks in Vancouver Island region; rare in Coos Bay region, taken in association with Diaulula sandiegensis and under rocks in Ulva beds (2752,p19); low tide (3803,p23,29); (2278,p237) rocky tide pools.

Cadlina luteomarginata (MacFarland, 1966)
Dist: Vancouver Island, B. C. to Pt. Eugenia, Mexico (3793,p426)

Cadlina marginata MacFarland, 1905
Dist: Vancouver Island to La Jolla (2752,p21), 27-54°N (5591)
Coll: B. C.: Vancouver Isl. (3803,p24); (2278,p237), Ore: Coos Bay region (2752,p20), Calif: Central coast (2033,p268)
Hab: Intertidal (2033,p268); associated with Zostera, seeks protection on underside of rocks in association with sponges, hydroids and encrusted algae on which it feeds; 2 1/2' above mean low tide level to extreme low tide in Coos Bay region, dredged at 25 fms in Vancouver Isl. region (2752,p20-21)--Coastal not found in Bay low tide (3803,p24,29) dredged (2278,p237)

Cadlina pacifica Bergh, 1870 - (2752,p21)
Dist: Alaska (2752,p22)
Coll: Alaska pools (2278,p237), Ore: Coos Bay region (2752,p21) RARE
Hab: Extreme low tide to about plus 2' (2752,p21)
Feeding: (2752,p22)

Chromodoris: see Glossodoris

MOLLUSCA - OPISTHOBRANCHIA - Dorididae

Diaulula sandiegensis (Cooper, 1862)
Dist: Many points on West Coast from Sitka to Coast of Patagonia on Atlantic Coast (2752, p24); (2778, p237), San Diego (2752), 27-57°N (5591)
Coll: B. C.: Vancouver Isl. (3803, p23), Ore: Coos Bay region (2752, p23), Calif: Central coast (2033, p269)
Hab: Intertidal (2033, p269); usually stays in protected crevices in rocks. capable of adhering quite strongly to rock substrate, has been found in places exposed to direct surf action (2752, p24), rocky tide pools (fucus zone) (2031, p235), 8-15 fms (3803) p. 23, low tide (3803, p29); (2278, p237)
Repro: Egg masses reported in Dec. and Jan. in Monterey Bay; Coos Bay region March-Sept. (2752)

Doridella steinbergae (Lance, 1962) - (See Franz, 1967) - (3793)
Corambella steinbergae
Dist: San Juan Islands to Coronados Islands (3793, p427)
Hab: Common. On bryozoan colonies on off-shore kelp. (3793, p427).

Discodoris fulva (O'Donoghue, 1924)
Coll: Vancouver Island (3803, p26); (2278, p237)
Hab: Shingle beach (3803, p26), low tide (2278, p237)

Discodoris heathi (MacFarland, 1905) - (2033, p269)
Dist: Vancouver Island to Monterey (2752, p26); Vancouver Island to Laguna Beach (3793, p427)
Coll: B. C.: Vancouver Isl. (3803, p23); (2278, p237), Ore: Coos Bay region (2752, p25), Calif: Central coast (2033, p269)
Hab: Intertidal (2033, p269); Found on almost bare rocks at 3' above 0 tide level. (2752, p25), 12-15 fms (3803, p23); pools (2278, p237)

Glossodoris califoriensis (Bergh, 1879) - (2033, p269)
Coll: Calif: Central coast (2033, p269); (2278, p237)
Hab: Intertidal (2033, p269); (2278, p237)

Glossodoris porterae (Cockerell, 1902) - (2033, p269)
Coll: Calif: Central coast (2033, p269)
Hab: Intertidal (2033, p269)

Rostanga pulchra (MacFarland, 1905) - (2033,p269)
Dist: Vancouver Island to Pt. Lobos, California (2752,p23); Vancouver Island to Gulf of California (3793,p428)
Coll: B.C.: Vancouver Isl. (3803,p23); (2278,p237); Ore: Coos Bay region (2752,p22); Calif: Central coast (2033,p269)
Hab: Intertidal (2033,p269); lives on red algae and red sponges (2031,p233); low tide (3803,p29); low tide and pools (2278,p237)
Food: (2852,p22-23)
Population: (2752)--Repro: after early July (2752)

Family: Arminidae

Armina californica (Cooper, 1862) - (3793,p429); (Bergh, 1862) (2033,p269)
Dist: 0-52°N (5591), (inferred) Vancouver Isl. to Panama (3793,p429)
Coll: B.C.: Vancouver Isl. 15-35 fms (2278,p239), Ore: 25-200 m (3003,p14), Calif: 16-48 fms, (2278,p239), Central coast (2033,p269)
Hab: Modified for a burrowing life in sand; often obtained by dredging. (2033,p269)
Food: Feeding patterns on Renilla koellikeri (3811,p440-441)

Armina vancouverensis Bergh, 1876
Armina columbiana (O'Donoghue, 1924) - (5591)
Dist: 45-49°N (5591)
Coll: Vancouver Island (3803,p11); (2278,p239)
Hab: 8-15 fms (3803,p13); (2278,p239)

Pleurophyllidia - see Armina

Family: Dendrodoridiae

Dendrodoris fulva (MacFarland, 1905) - (2033,p269)
Coll: Calif: central coast (2033,p269); (2278,p237)
Hab: Intertidal (2033,p269); pools (2278,p237)

Family: Dendronatidae

Dendronotus dalli Bergh, 1879
Dist: 38-55°N (5591)

Dendronotus frondosus (Ascanius, 1774) - (2752,p31)
Dist: Circumboreal, Bering Sea, Alaska, Vancouver Island region (2752,p31), 38-58°N (5591)
Coll: B. C.: Vancouver Island (2278,p239), Ore: Coos Bay region (2752,p31)
Hab: Found in subtidal association with hydroids, presumably feeds exclusively on hydroids (2752,p31); 15-20 fms (2278,p239)
Feeding: See above
Repro: Spawns present during June and July (2752)

Dendronotus giganteus O'Donoghue, 1921 - (2033,p269)
Coll: B. C.: Vancouver Island (3803,p24); (2278,p239)
Calif: Central coast (2033,p269)
Hab: One of the largest nudibranchs on this coast. Like others of this genus, it is capable of swimming short distances by an undulating motion of the body (2033,p269); 10-25 fms (3903,p24); (2278,p239)

Dendronotus iris (Cooper, 1862)
Dist: (inferred) Vancouver Island to Coronados Island (2792,p429) 38-52°N (5591)
Coll: Calif: Monterey, 28 fms (2278,p239)

Dendronotus rufus O'Donoghue
Coll: B. C.: Vancouver Island (3803,p24)
Hab: 6-20 fms (3803,p24); (2278,p239)

Family: Duvauceliidae

Tritonia exsulans Bergh, 1894 - (5591,p142); (3793,p428)
Duvaucelia exsulans (Bergh, 1894) - (2033,p268)
Dist: Vancouver Island to Baja California; Japan, Florida (3793,p428), 33-54°N (5591)
Coll: Calif: Central coast (2033,p268)
Hab: Intertidal (2033,p268); Subtidal from 180' (3793,p428)

Tritonia festiva (Stearns, 1873) - (5591); (3793,p429)
Duvaucelia (*Tritonia*) *festiva* (Stearns, 1873) - (2033,p268)
Sphaerostoma undulata
Dist: Vancouver B. C. to Coronado Islands, California (3793,p429) 32-55°N (5591), (3803); (2278,p237)
Coll: Ore: Coos Bay region (2752,p26), Calif: Central coast (2033,p268); Pt. Pinos, at low tide (2752,p27)
Hab: Intertidal (2033,p268), 8-18 fms on bottom of shell and debris (3803,p6), low tide (2278,p237), usually found lower down in intertidal zone (2752,p26) (Proct. outer coast)

Tritoniopsis tetraquetra (Pallas, 1788) - (5591,p143)
Duvaucelia tetraquetra (Pallas, 1788) - (2033,p268)
Tochunia tetraquetra (Pallas, 1788) - (3793,p429)
Dist: Alaska to Santa Barbara (3793,p429), 36-57°N (5591)
Coll: Calif: Central coast (2033,p268)
Hab: Intertidal (2033,p268)

Family: Fimbriidae

Melibe leonina (Gould, 1853)
Dist: Alaska to La Paz Bay, Mexico; Bahia de Los Angeles (3793,p427), 24-57°N (5591)
Coll: B. C.: Vancouver Isl. (3803,p24); Calif: 20 fms (2278,p239) Central (2033,p270)
Hab: Eel grass and other marine plants - intertidal (2033,p270), sp. *RARE* - on entangled offshore kelp fronds (2793,p427) *pelagic* possibilities (3803,p24-25); (2278,p239)
Repro: spawn on *Zostera* beds (3803,p25)

Family: Dironidae

Dirona albolineata Cockerel and Eliot, 1905 - (2033,p269)
Dist: Puget Sound to San Diego (3793,p426) RARE, 33-50°N (5591)
Coll: B. C.: Vancouver Isl. (3803,p24); (2278,p239), Vancouver Isl. region, Pacific Grove and Corona del Mar (2752,p32), Ore: Coos Bay region (2752,p32), Calif: Central coast (2033,p260)
Hab: Intertidal (2033,p269); (3803); in Coos Bay, between 0 and 2' mean low tide level in quiet, rocky tide pools inhabited by *Triopha carpenteri*, *Hermissenda* species, *Zostera* and *Costeria* and other brown algae; 20 fms (2752,p32), low tide (3803,p24,31); low tide to 20 fms (2278,p239)

Dirona picta MacFarland, Cockerell and Eliot, 1905 - (2033,p269)
Dist: Dillon Beach to Pt. Loma (3793,p426)
Coll: Calif: Central coast (2033,p269); (2278,p239)
Hab: Intertidal (2033,p269), low tide (2278,p239)

Family: Okeniidae

Ancula pacifica MacFarland, 1905 - (2033,p269)
Coll: Calif: Central coast (2033,p269); (2278,p238)
Hab: Intertidal (2033,p269), pools (2278,p238)

Hopkinsia rosacea MacFarland, 1905 - (2033,p269)
Dist: Coos Bay to Pt. Loma (3793,p427)
Coll: Calif: Central coast (2033,p269); (2278,p238)
Hab: Intertidal (2033,p269); (2278,p238)

Family: Zephyrinidae

Antiopella barbarensis (Cooper, 1863) - (3793,p425)
Dist: Vancouver Island to Bahia San Quentin (frequent) (3793,p425)

Coryphella trilineata O'Donoghue, 1921
Dist: Vancouver Island to Coronados Islands. (common) (3793,p426)
Coll: B. C.: Vancouver Island (3803,p25); (2278,p239)
Hab: Low tide; 8-15 fms (3803,p25); (2278,p239)

Eubranchus olivacea (O'Donoghue, 1922) - (2033,p269); (2278,p239)
Coll: B. C.: Vancouver Isl. (3803,p25); (2278,p239)
Hab: Intertidal (2033,p269); low tide on Obelia longissima and Zostera bed (3803,p26); (2278,p239)

Galvinia see Euhanchus

Janolus fuscus O'Donoghue, 1924 - (2033,p270); (3803)
Coll: B. C.: Vancouver Isl. (3803), Calif: Central coast (2033,p270)
Hab: Intertidal (2033,p270) on Ulva sp. under rocks; low to 15 fms (3803,p18); (2278,p239)
Repro: Spawning (3803,p18-19)

Family: Fionidae

Fiona pinnata (Eschscholtz, 1831) - (2033,p269)
Dist: 30-60°N (5591)
Coll: Calif: Central coast (2033,p269); (2278,p240)
Hab: On driftwood bearing gooseneck barnacle colonies; cerata bear branchial membranes (2033,p269); pelagic (2278,p240)

Family: Aeolidiidae

Hermissenda crassicornis (Eschscholtz, 1831) - (2033,p269)
Dist: Sitka to California (2752,p33), Alaska to Pt. Eugenia, Mexico; Peurtiecitos, Bahia de Los Angeles (3743,p427) 27-57°N (5591)
Coll: B.C.: Vancouver Isl. (3803,p26); (2278,p240), Ore: Coos Bay region (2752,p33), Calif: Central coast (2033,p269)
Hab: Widely varying e.g., rocks, mud, wharf pilings (2033,p269), stones, eel grass, pilings and in tide pools (2031,p247), Feed on Ulva, Laminaria and Halicystis in bay habitatis; herivorous and capable of feeding on brown and green algae; on Obelia at Fisherman's Wharf; extreme low tide to approx. 2' above mean low tide level. Dredged from 6-10 fms in Alaskan waters, intertidal in Vancouver Isl. region low tide (3803,p26,31); (2278,p240)
Misc: Population ecology (2752,p34)
Repro: Early summer months

Family: Aeolidiinae

Aeolidia papillosa (Linnaeus, 1761) - (2033,p269)
Dist: Cosmopolitan 30-60°N (5591)
Coll: Alaska: Intertidal (2752,p35), B.C.: low tide in Vancouver Isl. region (2752,p35); (2278,p240) Calif: Central coast (2033,p269); subtidal (2752,p35)
Hab: Intertidal (2033,p269); 4' above mean low tide and at extreme low tide; 400 fms off Santa Barbara Isl. Feeds on coelenterates; feeds on anemones and hydroids in protected coarse sandy beach, mud flats, and protected muddy bay habitats; found in association with and feeding upon Bunodactis, Aiptasiomorpha, Metridium, Obelia, Tubularia, Plumularia (2752,p35); low tide at Vancouver Isl.; 414 fms Calif. (2278,p240)
Feeding: See above

Flabellinopsis iodinea (Cooper, 1862) - (3793)
  Flabellina iodinea (Cooper, 1862) - (2033,p269); (3793)
    Dist: Vancouver Island to Coronados Islands (3793,p427) (frequent), 32-54°N (5591)
    Coll: Calif: Central coast (2033,p269); (2278,p239)
    Hab: Intertidal (2033,p269), pools (2278,p239)

Subclass: Pulmonata
Family: Ellobiidae

Phytia setifer (Cooper, 1872) - (2033,p263)
  Dist: 34-42°N (2551)
  Coll: Calif: Central coast (2033,p263)
  Hab: Characteristic of Salicornia marshes (2033,p263)

Family: Siphonaria

Siphonaria thersites (Caprenter, 1864) - (2551)
  Dist: 48-56°N (2551); Aleutian Islands to Puget Sound (3815,p92)
  Hab: Rocky ocean beaches (3815,p92)

Williamia vernalis (Dall, 1870) - (2033,p263)
  Dist: 27-41°N (2551)
  Coll: Calif: Central coast (2033,p263)
  Hab: Intertidal (2033,p263)

Family: Trimusculus

Gadinia reticulata - See Trimusculus

Trimusculus reticulatus (Sowerby, 1835) - (2551); (2033,p263)
  Dist: 23-41°N (2551)
  Coll: Calif: Central coast (2033,p263)
  Hab: Generally found hanging from underside of ledges. Eggs are laid in jelly masses and hatch to free-swimming veligers (2033,p263)

Incertae sedis

Family: Onchidiidae

Arctonchis borealis (Dall, 1871)
  Dist: 42-56°N (2551)

MOLLUSCA - PULMONATA

Onchidella - See Arctonchis

Incertae sedis

Zizyphinus filosus (Wood, 1828) - (2021, p7)
Dist: Cosmopolitan species found abundantly throughout the littoral belt along the rocky coasts of Oregon and California (2021, p7)

Class: CEPHALOPOD

Abraliopsis felis (McGowan and Okutani, 1968) - (2341)
Dist: Approx. 25-43°N (3754, p78)
Coll: Ore: (2341)
Life cycle: Most abundant larvae in Calif. Current - most during June and July . . . peak spawning in early summer. (3754, p77)

Chiroteuthis veranyi (Ferussac) - (2341)
Coll: Ore: (2341)

Cranchia scabra Leach
Coll: Ore: (2341)

Galiteuthis armata (Joubin)
Coll: Ore: (2341)

Galiteuthis pyllura (Berry, 1911) - (3797)
Dist: 39°30'N to 41°30'N, (3797, p202)
Coll: N. Calif: (3797, p202)

Gonatopsis borealis (Sasaki)
Coll: Ore: (2341)
Remarks: Relative growth pattern (2590, p171-173)

Gonatus anonychus Pearcy and Voss
Coll: Ore: (2341)

MOLLUSCA - CEPHALOPOD

Gonatus fabricii (Lichtenstein, 1818)
Coll: Ore: (2341)
Remarks: Relative growth pattern (2590,p172-173)

Gonatus magister Berry
Coll: Ore: (2341)

Japetella heathi (Berry)
Coll: Ore: (2341)

Loligo opalescens (Berry, 1911) - (3797,p201)
Coll: Puget Sound, pelagic (2031,p317), Ore: (2341),
Calif: North of Eureka in 100 fms (3797,p201)

Meleagroteuthis holyei (Puffer, 1900) - (3797,p202)
Dist: 39°30' - 41°30'N in 300+ fms (3797,p202)
Coll: Ore: (2341)

Meroteuthis robusta (Verrill, 1876) - (3797,p202)
Morotheuthis robusta (Dall) Verrill - (2341)
Coll: Ore: (2341), Calif: off Eureka (3797, p202)

Octopoteuthis sicula (Ruppell)
Coll: Ore: (2341)

Octopus californicus (Berry, 1911) - 3797,p201)
Coll: Calif: North of Eureka (3797,p201)
Hab: Less than 100 fms on sandy bottom (3797,p201)

Octopus dofleini martini Picford, 1964 - (3797,p201)
O. punctatus
O. honkongensis
O. apollyon
Coll: N. Calif: Between 39°30' and 41°30' (3797,p201)
Hab: Deep intertidal down to around 40 fms, usually in
hard mud or rocky substratum (3797,p201)

Octopus leioderma (Berry, 1911) - (3797,p201)
Coll: N. Calif: Between 39°30' and 41°30' (3797,p201)
Hab: Muddy sand substratum in 50 fms (3797,p201)

MOLLUSCA - CEPHALOPOD

Onychoteuthis banksi (Leach)
Coll: Ore: (2341)

Opisthoteuthis californiana - (3752,p201)
Opisthoteuthis californicus (Berry, 1949) - (3797,p201)
Coll: Off N. Calif. coast between 39°30' and 41°30' N, between 100 - 300 fms. (3797,p201); Humboldt Co. - Santa Barbara Co. (3752,p221)
Hab: Taken from about 840' (3752,p221)

Polypus hongkongensis Holyle
Coll: Puget Sound (2031,p319)
Feeding: Crabs, shrimp, and worms (2031,p219)

Rossia pacifica (Berry, 1911)
Coll: Ore: (3003,p13); N. Calif: between 39°30' and 41°30' (3797,p202)
Hab: 100 fms on sandy mud to mud bottom (3797,p202)

Stiliger fuscouittata Lance, 1962
Dist: San Juan Islands to San Diego; Bahia de Los Angeles frequent (3793,p428)

Taonius pavo (Lesueur)
Coll: Ore: (2341)

Vampyroteuthis infernalis (Chun)
Coll: Ore: (2341)

PHYLUM ECHINODERMATA
Class: ASTEROID

Asterina miniata (Brandt)
Patiria miniata
Dist: Sitka, Alaska to San Diego, Calif. (3111)
Coll: Wash.: Puget Sound (2031)
Hab: Low water - 165 fms (3111)
Asymmetry: (3262)

Ctenodiscus crispatus (Retzius)
Dist: Bering Sea of Japan south to Gulf of Panama, Arctic Ocean, North Atlantic (3111); (3109)
Coll: Wash.: 176 fms (3109, p36)
Hab: 31-1033 fms (3109)
Food: Detritus (3109); (3286)

Dermasterias imbricata (Grube, 1857)
Dist: Sitka, Alaska, to Monterey Bay, California (3111); (3108), (3286)
Coll: Wash: Puget Sound (2031), Shore collections (3109, p250); Ore: 50-53 fms (3108), Shore collections (3109, p250), 10m (3003, p17)
Food: *Mediaster*, holotharians and crustaceans (3286)

Diplopteraster multipes (Sars)
Dist: Bering Sea to San Diego, Calif. (3111)
Hab: 81-640 fms (3111)

Evasterias troschelii (Stimpson, 1862)
Dist: Pribilof Islands to Monterey Bay (3111)
Coll: Wash: Puget Sound (2031); (3111); Ore: 10 m (3003, p17); Calif: Humboldt Bay (3111)
Hab: 0-39 fms (3111)
Food: Mussels and clams

Henricia leviuscula (Stimpson, 1857)
ssp. *spiculifera* (Clark)
Dist: Aleutian Islands to California (3111); (3286)
Coll: Wash: Puget Sound (2031), 27-40 fms (3109, p284-285); Ore: 46-200 m (3003, p17); 46-64 fms (3109, p284-295)
Hab: Low-tide to 53 fms (3111)
Food: Probably suspended particular matter (3286)

ECHINODERMATA - ASTEROID

Hippasteria spinosa Verrill, 1909
Dist: Sea Okhotsh, Alaska to California (3108)
Coll: Wash: 28-100 fms (3109, p226); Puget Sound (2031), Ore: 100-800 m (3003, p17); 28-93 fms (3109, p226)
Hab: 18-280 fms (3108)27-121 fms (3111)

Leptasterias aequalis (Stimpson)
Dist: San Juan Islands to Santa Catalina Islands (3111, p246); (3286)
Hab: Climax species in biotic succession of Mytilus californianus community (2233, p246)
Food: Small mussels and gastropods

Leptasterias hexactis (Stimpson)
Dist: Aleutians to Cape Flattery (3111)
Coll: Wash: Puget Sound (2031); Ore: (Known to authors) many forms, all from north to Cape Flattery (3111)
Hab: Intertidal (3111, p115)
Brooding behavior: (3335)
Develop. and Repro: (5824); (3260)
Systematics in San Juan Islands: (3336)

Lophaster fucilliger Fisher, 1904
Dist: Oregon (3003, p17) 92-2176 m, var. vexator from Bering Sea to Northern California 75-350 fms (3111)

Ludia foliolata Grube, 1866
Dist: Alaska to California (3108); (3111); (3109, p109)
Coll: Wash: (3109, p110-112), Ore: 40-366 m (3003, p17), 23-77 fms (3109, p110-112), 50-235 fms (3108)
Hab: 10-335 fms (3108), 10-189 fms (3111); 3109, p109)
Food: Ophiuroids, Scaphopods (Dentalium) (3109)

Mediaster aequalis Stimpson, 1857
Dist: Alaska to California (2031), (3108), (3111)
Coll: Wash: Puget Sound (2031); off Wash, 40 fms (3109, p200, 201) Ore: 46-800 m (3003, p17); 42-93 fms (3109, p200, 201)
Hab: Intertidal in northern part of range (2031); subtidal - 167 fms (3108); 9-160 fms (3111)

ECHINODERMATA - ASTEROID

Orthasterias koehleri (de Loriol)
Dist: Alaska to Santa Rosa Isalnd (3111)
Coll: Wash: 27-100 fms (3110,p147), Ore: 53-64 fms (3110,p147)
Hab: Subtidal to 125 fms (3111)

Patiria miniata
Dist: Stika, Alaska to Baja Calif. (3286)
Food: Highly omnivorous; plant and animal material (3286)

Pisaster brevispinus (Stimpson, 1857)
forma pancispinum (Stimpson)
Dist: Alaska to California (3111), (3286)
Coll: Wash: Puget Sound (2031), Ore: 22-55 m (3003,p17); 50-53 fms (3108)
Hab: 0-56 fms (3111); subtidal (2031)
Food : Clams, mussels, barnacles, sand dollars (3286)
Misc: (5839)

Pisaster giganteus (Stimpson)
Dist: Vancouver Island to Monterey Bay (3111); to Baja (3286)
Hab: 0-48 fms (3111)
Feeding: Mussels, barnacels (3826)

Pisaster ochraceous (Brandt)
Dist: Alaska to California (3111)
Coll: Wash: Puget Sound (2031), Ore: intertidal, Calif: Crescent City (3111,p170)
Hab: 0-48 fms (3111)
Temp: Seldom experiences water temp. below 10°C or above 16°C; tolerates air temp. of 21°C in laboratory for at least 3 hours (3286); at 12-18°C can go for 18 mo. w/out food (5823)
Feeding: Mussels, barnacles and gastropods (5823); (2001)
Gen. Biol: (2003), (5839)

Poraniopsis inflata (Fisher, 1906)
Dist: Oregon to California; Japan (3108)
Coll: Ore: 101-128 m (3003,p17)
Hab: 26-159 fms; 26-200 fms (3108)

ECHINODERMATA - ASTEROID

Pseudarchaster parelis alascensis Fisher
Dist: Alaska to Oregon (3108)
Coll: Ore: 50-300 fms (3108), 750-1058 fms (3108)
Hab: 68-1064 fms (3111)

Pteraster tessalatus arcuatus Fisher
Dist: Oregon to California (3108)
Hab: 46-100 fms (3108)
Dev: (3337)

Pycnopodia helianthoides (Brandt, 1835)
Dist: Aleutian Islands to California (3108), (3111)
Coll: Washington: Puget Sound, shallow (2031); low tide to 50 fms (3110,p159), Ore: 50-53 fms (3108)
Hab: Intertidal to 238 fms (3108), (3111)
Feeding: Feeds on clams and crustaceans voraceous (2031), Clams, gastropods, crustaceans, echinoderms, occassionaly algae and sponges (3286)
Behav. and bilateral tendencies (2293)

Rathbunaster californicus Fisher
Dist: Oregon to California (3108)
Hab: 73-369 fms (3108)

Solaster dawsoni Verrill, 1880
Dist: Aleutian Islands to California (3111)
Coll: Wash: Puget Sound (2031); 24-34 fms (3109,p315), Ore: 77-106 m (3003,p17)
Hab: Low tide to 229 fms (3111)

Solaster papposus (Linnaeus, 1767)
Crossaster papposus
Dist: Washington to Oregon (3109,p328)
Coll: Wash: 27-100 fms (3109,p328), Ore: 59 fms (3109,p328), 82-126 m (3003,p17)

Solaster stimsoni Verrill, 1880
Dist: Bering Sea to Oregon (3111)
Coll: Wash: Puget Sound (2031); 15-27 fms, intertidal (3109,p312), Ore: 100 m (3003,p17), 33 fm (3109,p312)
Hab: Low tide to 33 fms (3111)

ECHINODERMATA - ASTEROID

Stylasterias forreri (deLoriol, 1887)
Dist: Southern Alaska to California (3111)
Coll: Ore: 50-150 m (3003,p17)
Hab: 16-291 fms (3111)

Class: ECHINOIDS

Allocentrotus fragilis (Jackson)
Dist: Vancouver Island to Baja California (3001)
Coll: Wash: numerous off Tatoosh light, 5 miles 171-170 fms (3227), Calif: Pacific Grove (3224); Monterey Bay (3011), (3013)
Hab: 50-1150 m (3001); fine sands to clayey silts (3001), two found in kelp bladder (3334)
Spawns in Feb. and March off Monterey Bay (3011)
Ciliate parasites (3224) at Pacific Grove

Brisaster latifrons (Agassiz)
B. townsendi (3000)
Dist: Alaska to California (3000); (3001)
Hab: 100-800 m (3000); (3001) on unconsolidated sediments, and grey terrginous sands (3001)
Closely related B. fragilis gets larger as one moves northward along the Norwegian coast Mortensen 1907 (3333)

Dendraster excentricus (Eschscholtz, 1831)
Dist: Alaska to Baja California (3001)
Coll: Wash: Moclips, Ocean City, Cohesset; Ore: Tillamook, Neskowin, Reedsport, Charleston; Calif: Crescent City, Little River Beach State Park.
Hab: Intertidal to 90 m (3001); Brackish waters to 100 fms, Alki Pt. Seattle (2315,p162); Terriginous white sands without silt or clay (3001); concentrated at 7 fms at Samoa, Calif. (2686,p39) on sandy bottoms.
Feeding: (2315), Locomotion: (2315)
Effect of temperature on test: (3012)
Cold water forms have heavier tests: (3012)
Temperature and Na, Mn, Fe, metabolism: (3043)
Develop. patterns: (3351), Histology (5825)
Remarks: Two tons in one 15 minute tow at 7 1/2 fms off Capolio Beach, Wash. (3413); found alive at 5-7 fms, all dead deeper (3412)
Misc: (5827)

ECHINODERMATA - ECHINOIDS

Strongylocentrotus droebachiensis (Müller)
Dist: San Juan Islands to Puget Sound (3227), (2001)
Coll: San Juan Islands (3227)
Ecology, taxonomy, growth: (3228)
Feeding: (2306)
Physiological-Biochemical study (5826)

Strongylocentrotus echinoides A. Agassiz and H. L. Clark
Dist: North Pacific south to 44°N on American side, 38°N on Atlantic side (3001) Also Bering-Baranve? (3001)
Hab: 33-780 m on gravel, rock, sand (3001)
Ciliate endocommensals from Friday Harbor (3223)
Ecology, taxonomy, San Juan Islands: (3227)

Strongylocentrotus franciscanus (A. Agassiz)
Dist: Alaska to Baja California (3001), (3002); Japan (3002)
Hab: Intertidal to 125 m (3001), (3002); rocky shores (3001)
Ecology, taxonomy: San Juan Island (3227)
Feeding: (2306)
Rhabdocoel parasite (2032)
Population explosion (3340)
Dev: (2302)

Strongylocentrotus purpuratus (Stimpson, 1857)
Dist: Alaska to Baja California (3001)
Coll: Ore: Sunset Bay, Coos Co. (2005)
Hab: Intertidal to 46 m (3001); rocky shores (3001)
Ecology, taxonomy: San Juan Islands (3227), S. Calif. (5816)
Temp. Data: (3295), 8-23.5°C range, 23.5°C limiting temp. as 25°C is lethal even after acclimination at 20°C for 4 days. Upper tolerance boundary very sharp as 23.5°C is within range. Can be acclimated to low temp. but not to high temp. Effect of temp. on dev. - range 13-20°C, 5° and 30°C no fertilization, 25°C is lethal to eggs (2835), T. and spawning (3286)
Climax species in biotic succession of Mytilus californianus community (2233)
Temp. tolerances (2835; intertidal temperatures: If internal temp. rises above 26° for 3-5 hr. over several days a heat kill results (3338, p94)
Population explosion (3340)
Repro: Annual breeding cycly w/max. activity in winter, reprod. may be independent, but illumination may be important (5836)

Feeding: herbivore (algae) catches floating debris, dead fish (2005,p1076), the stipes of Macrocystis are a favorite
Growth rates: (2005)
Ribosamal activity (5828), Regeneration (5830), Respiration (5831) Digestion (5837), Digestive System (5832)
Misc: (5833), (5834), (5835), (5838)

Class: HOLOTHUROIDS

Caudina chilensis (J. Muller)
Dist: California (2033,p294)
Hab: Sand dweller, rare in this area (2033,p294)

Cucumaria curata Cowles
Dist: California (2033,p294), (2309)
Coll: Dillon Beach (2047), below Mytilus beds. Most significant factor influencing coastal distribution is the brooding habit (2047)
Hab: Occurs in great numbers under corallines and under mussels on exposed ledges (2033,p294)
Feeding: (5828)
Morphology (2047); Behavior (2047); Pigments (2047), variation (2312), Dev. and Embryology (2047)

Cucumaria fisheri Wells
Dist: California (2033,p294)
Hab: Intertidal (2033,p294)

Cucumaria lissoplaca Clark
Dist: California (2033,p294)
Hab: Intertidal (2033,p294)

Cucumaria lubrica Clark
Dist: Washington to California (2031), (2033,p294)
Coll: Wash: Puget Sound (2031)
Hab: Under rocks at low tide (2031,p169)

Cucumaria miniata (Brandt)
Dist: Puget Sound to Point Arena, Calif. (2033,p294)
Coll: Wash: Puget Sound (2031), (2033,p294), Calif: Point Arena (2033,p294)
Hab: Under rocks and crevices at low tide (2031,p167)
Anotomy (3283)

ECHINODERMATA - HOLOTHUROIDS

Cucumaria piperata (Stimpson)
Dist: Washington to California (2033,p294)
Rare in central California, abundant at Friday Harbor Wash. (2033,p294)

Cucumaria populifera (Stimpson)
C. tenuicoriata Wells
Dist: California (2033,p294)
Hab: Intertidal (2033,p294)

Cucumaria trachyplaca Clark
Dist: California (2033,p294)
Hab: Intertidal (2033,p294)

Eupentacta quinquesemita (Selenka)
Dist: California (2033,p294)
Hab: Intertidal (2033,p294)

Leptosynapta albicans (Selenka)
Dist: California (2033,p294)
Hab: Intertidal (2033,p294)

Leptosynapta inhaerens (O. F. Muller)
Hab: Burrows deep in sand or mud (2031,p163)

Molpadia intermedia (Ludwig)
Dist: Oregon (3003,p21)
Coll: 190-2800 m (3003,p21)

Pachythone rubra (Clark)
Dist: California (2033,p294)
Hab: Intertidal (2033,p294)

Parastichopus californicus (Stimpson)
Syn: Stichopus californicus (3003,p21)
Dist: Washington to California (2031), (2033,p294)
Coll: Wash: Puget Sound (2031), Ore: 50-245 m (3003,p21)
Evisceration in fall (3371)

Pentacta piperata Stimpson
Dist: Washington (2050,p161)
Coll: Puget Sound (2050,p161)

ECHINODERMATA - HOLOTHUROIDS

Pentacta populifera Stimpson
Dist: Washington (2050,p161)
Coll: Puget Sound, circumlittoral (2050,p161)

Pentamera populifera (Stimpson)
Dist: Oregon (3003,p21)
Coll: 150-200 m (3003,p31)

Thyonepsolus nutriens Clark
Dist: California (2033,p294)
Hab: Often found in kelp holdfasts (2033,p294)

Class: OPHIUROIDS

Amphiodia urtica (Lyman)
Dist: Alaska to California (3235,p1734)
Coll: Wash: Puget Sound, outer coast (3235)
Hab: Littoral and sublittoral, intertidal to 100 fms (3235,p1734); maceous net suspension feeder, tube foot capture sol. surface browsing (3235)
Feeding: (3293)

Asteronyx loveni Muller and Troeschel
Dist: Norway, Scotland, Japan, east and west coasts of United States, Alaska, British Columbia, Philippine Islands (3235,p1730), Bathyal, 83-918 fms
Coll: Wash: outer coast (3235)
Feeding: Juveniles - bottom feeders; adults mount pennatulids, feed on zooplankton (3235)

Axiognathus squamata (Delle Chiaje)
Dist: In polar, temperate, and tropical waters throughout world (3235)
Coll: Wash: outer coast, Puget Sound (3235)
Hab: Littoral and sublittoral, intertidal to 100 fms (3235); browser and detritus feeder (3235)

Diamphiodia occidentalis (Lyman)
Dist: Alaska to California (3235,p1734)
Coll: Wash: Puget Sound (3235); Straits of Juan de Fuca (3235)
Hab: Intertidal to 12.5 fms (3235,p1734); mucous net suspension feeder, tube foot capture, sub-surface browsing (3235)
Feeding: (3293)

ECHINODERMATA - OPHIUROIDS

Diamphiodia periercta (Clark)
Dist: Sea of Japan, Alaska to Oregon (3235,p1734)
Coll: San Juan Islands (3235)
Hab: Intertidal to 15 fms (3235,p1734)
Feeding: Deposit and filter feeder (3235)

Gorgonocephalus caryi (Lyman)
Dist: North Pacific (3235)
Coll: Wash: outer coast, San Juan, Juan de Fuca (3235)
Ore: 100-1372 m (3003,p20)
Hab: 5-900 fms (3235); predator on sea peas (2300,p29)
Repro: (2718)

Ophiopholis bakeri McClendon
Dist: British Columbia to California (3235,p1732)
Coll: Wash: outer coasts, straits (3235)
Hab: Outer sublittoral to upper bathyal, 35-204 fms (3235,p1732) sand, rock, shell (3235)

Ophiopholis aculeata (Linnaeus)
Dist: Circumboreal; south to California (3235,p1732)
Hab: Very large bathymetrical range, intertidal to 600 fms (3235)

Ophiophthalmus normani (Lyman)
Dist: Widespread in North Pacific (3235,p1732)
Coll: Wash: outer coast 40-877 fms (3235)
Hab: Outer sublittoral to abyssal, 40-1050 fms (3235,p1732)

Ophiura sarsii Lutken,
Dist: North circumpolar, common in north temperate waters (3235,p1731)
Coll: Wash: outer coast, Puget Sound (3235)
Hab: Littoral to abyssal, 3-1700 fms (3235,p1731)
Predation (3235), Feeding (2300,p28), (3292)

Ophiura lutkeni (Lyman)
Dist: Bering Sea to California (3235)
Coll: Wash: Puget Sound (3235), Ore: (3003,p20)
Ecology, feeding (3235); Benthic surface feeders (3235), (3285)

ECHINODERMATA - OPHIUROIDS

Ophiura leptoctenia H. L. Clark
Dist: Alaska to California, Sea of Japan (3235,p1731)
Coll: Wash: Outer coast, Puget Sound (3235)
Hab: Littoral to abyssal, 5-1771 fms (3235,p1731); omnivorous, detritus and animal food (3235)

Unioplus macraspis (Clark)
Dist: Widspread in North Pacific (3235,p1733)
Coll: Wash: outer coast and Puget Sound (3235)
Hab: Littoral to abyssal, 10-749 fms (3235,p1733); silts and clays but also sand (3235)

Unioplus strongyloplax (Clark)
Dist: West coast of United States (3235,p1733)
Coll: Wash: outer coast, Puget Sound (3235)
Hab: Littoral to upper bathyal, 2-200 fms (3235,p1733); mud with some sand and gravel (3235)

PHYLUM CHORDATA

Class: LARVACEA

Oikopleura sp.
Coll: Off Ore. (2341)

Class: ASCIDIACEA

Amaroucium arenatum Van Name, 1917
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Amaroucium californicum Ritter and Forsyth, 1917
Dist: Puget Sound (2031,p401), to central California (2033,p310)
Hab: Intertidal (2033,p310)

Amaroucium propinquum Van Name, 1945
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

CHORDATA - ASCIDIACEA

Amaroucium solidum Ritter and Forsyth, 1917
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Ascidia ceratodes (Huntsman, 1912)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Ascidiopsis paratropa Huntsman
Coll: Puget Sound region (2031,p387)

Boltenia villosa (Stimpson, 1864)
Dist: Puget Sound (2031,p397), to central Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Botryllus tuberatus Ritter and Forsyth, 1917
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Chelysoma producta Stimpson
Coll: Puget Sound, Lummi Island 8-12 fms (2050,p161)

Chelyosoma productum (Stimpson, 1864)
Dist: Puget Sound (2031,p393), to central Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Ciona intertinalis (Linnaeus, 1767)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Clabelina huntsmani Van Name, 1931
Coll: Central Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Cnemidocarpa finmarkiensis (Kiaer, 1893)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Cnemidocarpa joanne (Herdman)
Coll: Puget Sound attached (2031,p394)

Corella inflata Huntsman
Coll: Puget Sound area (2031,p391)

CHORDATA - ASCIDIACEA

Cynthia coriacea Stimpson
Coll: Puget Sound (2050,pl60)

Cynthia gibbsii Stimpson
Coll: Puget Sound, Lummi Island. 15 fms (2050,pl59)

Cynthia haustor Stimpson
Coll: Puget Sound (2050) circumlittoral zone

Cynthia villosa Stimpson
Coll: Puget Sound, Port Townsend, 8-15 fms also at
Lummi Island. (2050,pl60)

Cystodytes lobatus (Ritter, 1900)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Didemnum carnulentum Ritter and Forsyth, 1917
Coll: Cent. Calif (2033,p310)
Hab: Intertidal (2033,p310)

Diplosoma pizoni Ritter and Forsyth, 1917
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Distaplia occidentalis Bancroft, 1899
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Eudistoma diaphanes Ritter and Forsyth, 1917
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Eudistoma molle (Ritter, 1900)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Eudistoma psammion Ritter and Forsyth, 1917
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

CHORDATA - ASCIDIACEA

Eudistoma ritteri Van Name, 1945
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Euherdmania claviformis (Ritter, 1903)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Metandrocarpa dura (Ritter, 1896)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Metandrocarpa taylori Huntsman, 1912
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Molgula verrucifera Ritter and Forsyth, 1917
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Perophora annectens Ritter, 1893
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Polyclinum planum (Ritter and Forsyth, 1917)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Pycnoclavella stanleyi Berrill and Abbott, 1949
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Pyura haustor (Stimpson, 1864)
Dist: Puget Sound (2031,p399), to central California (2033,p310)
Hab: Intertidal (2033,p310)

Pyura mirabilis (von Drasche, 1884)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

CHORDATA - ASCIDIACEA

Saccoglossus pusillus
Coll: Cent. and S. Calif. (2033,p295)
Hab: Intertidal (2033,p295)

Sigillinaria aequali-siphonia (Ritter and Forsyth, 1917)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Sigillinaria pulchra (Ritter, 1901)
Coll: Cent. Calif. (2033,p310)

Styela gibbsii (Stimpson)
Coll: Puget Sound region (2031,p389)

Styela montereyensis (Dall, 1872)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Styela plicata (Lesueur, 1823)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Styela truncata Ritter, 1901
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Synoicum par-fustis (Ritter and Forsyth, 1917)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Trididemnum opacum (Ritter, 1907)
Coll: Cent. Calif. (2033,p310)
Hab: Intertidal (2033,p310)

Class: THALLIACEA

Doliolum sp.
Coll: Off Ore. (2341)

Helicosalpa virgula (Vogt)
Coll: Off Ore. (2341)

CHORDATA - THALLACEA

Iasis zonaria (Pallas)
Coll: Off Ore. (2341)

Pegea confoederata (Forskall)
Coll: Off Ore. (2341)

Pyrosoma atlanticum (Peron)
Coll: Off Ore. (2341)

Salpa fusiformis Cuvier
Coll: Off Ore. (2341)

Thalia democratica (Forskal)
Coll: Off Ore. (2341)

Thetys vagina Tilesius
Coll: Off Ore. (2341)

Class: AGNATHA
Order: Myxiniformes (Hyperotreti)
Family: Myxinide--Hagfish

Polistotrema deani Evermann and Goldsborough - (2049, p366)
Dist: Alaska to Santa Barbara Islands, Marine. Common. Destructive to fish. (2049, p366)
Coll: Wash: Cape Flattery, 85 fms. Ore: Yaquina Bay. (2049, p366)

Polistotrema stoutii (Lockington) - (2049, p366), (2390, p67)
Dist: B. C. to San Diego, Calif. Marine. Common. Destructive to fish. (2049, p366); (2390)
Coll: Puget Sound Region: Seattle, Wash: Puget Sound, Cape Flattery, 85 fms. Ore: Yaquina Bay (2049, p366)
Remarks: Attacks large fishes and sucks soft parts (2390)

Order: Petromyzontiformes (Hypoartii)
Family: Petromyzontidae--Lampreys

Entosphenus tridenatus (obsolete nomenclature) see Lampetra tridentata

Lampetra ayressi Gunther (2390,p69-70)
Dist: Northern B.C. to Northern Calif. (2390,p69-70)
Hab: Anadromous (2390,p69-70)
Habits: Attacks salmon and sucks body fluids (2390,p69-70)

Lampetra tridentata (Gairdner) - (agnatha, three-toothed lamprey, Pacific lamprey) (2049,p366), (2341), (2571,p22, 34-6), (2390)
Dist: Unalaska, Alaska to southern California
Coll: Wash: Coastal, Puget Sound, Pleasant L. and Bogachiel R., Humptulips R., Satsop R., Ft. Steilacoom., Seattle L.; Columbia Drainage: Astoria, Willamette R., Walla Walla R.; and Garrison Cr., Rock Id. Dam.; Ore coast: Nestucca, Umpqua, Coquill, Rogue R., Klamath R. and Upper Klamath L.; Goose Lake drainage: Goose L. (2049,p366), (2571,p22),(2341)
Hab: Anadromous (2571,p34), Freshwater and marine.
Remarks: Common, destructive to fish, slight commercial value (2049,p366), (2571,p34), Spawns in fresh water and sucks body fluids, salmon and steelhead particularly (2390)

Class: CHONDRICHTHES
Order: Squaliformes (Selachii)
Family: Hexanchide--Cowsharks

Hexanchus corinum Jordan and Gilbert (obsolete nomenclature) see Hexanchus griseus (Bonnaterre)

Hexanchus griseus (Bonnaterre) - (shovel nose, mud shark, sixgill cowshark) (2049,p367), (2567,pl2), (2572,p40)
Dist: Puget Sound to Monterey Bay.
Coll: B.C.: Departure Bay (2390); Wash: Puget Sound region--San Juan Islands (2049,p367), Neah Bay (2049,p367)
Hab: Marine, bottom, also found in deep water (2567,pl2); (2572,p40).
Misc: Not rare, slight commercial value (2049,p367), (2567,12), (2572,p40), (2390), Feeds on fish and crustaceans (2572,p40)

CHORDATA - FISHES - Hexanchide

Notorynchus maculatus Ayres - (mud shark, sevengill cowshark, spotted cowshark) (2049, p367), (2390), (2567, pl2), (2572, p41)
Dist: Wash: Puget Sound to Monterey Bay, Calif.
Coll: B. C.: Pender Island, Butedale, Bonilla Island (2390)
Wash: Puget Sound region--Nisqually.
Hab: Fairly deep water (2567, pl2), slight commercial value (2049, p367), (2567, pl2), (2572, p41)

Family: Lamnidae--Mackerel sharks

Alopias volpinus (Bonnaterre) - (common thresher, fox shark, long-tailed) (2049, p367), (2390), (2567, pl4), (2572, p47)
Dist: Pacific Oceans.
Coll: B. C.: Otter Point, Goose Bay, Saanich Inlet, Johnstone Strait (2390), Ore: Coastal, Coos Bay (2049, p367)
Hab: Pelagic, coming close to shore at times, Marine (2390)
Misc: Not rare, slight commercial value (2049, p367), (2567, pl4), Eats fish, pilchard, herring (2390)

Cetorhinus maximus (Gunner) - (basking shark, elephant shark, bone shark) (2049, p367), (2341), (2567, pl6), (2572, p46), (2390), (3804, p88)
Dist: Arctic seas, straying southward to California, Virginia and Portugal. Common northward (2049)
Coll: B. C.: (2049, p367), Queen Charlotte Sound (2390), Calif: Central Calif. from fall to spring (2572, p46)
Hab: Marine
Misc: No commercial value in this region (2049, p367)
Remarks: Feed on small organisms strained from water with gill rakers.

Lamna ditropis Hubbs and Follett - (salmon shark, mackerel shark), (2567, pl5), (2572, p43), (2390)
Dist: Coastal north Pacific from Alaska to southern Calif. (2567, pl5); (2390)
Coll: B. C.: Hippa Island (2390)
Hab: Pelagic (2390)
Misc: Feeds on salmon and other fishes (2390)

Family: Scyliorhinidae--Cat sharks

Apristurus brunneus (Gilbert) - (brown shark, cat shark) (2049, p367), (2567, pl7) (2572, p49), (2390)
Dist: Wash., Puget Sound to Gulf of California.

Apristurus brunneus (continued)

Coll: B.C.: Nanaimo, Porlier Pass, English Bay, Howe Sound. (2390) Wash: Puget Sound, Hoods Canal, Saratoga Passage, Everett, (2049, p367)

Hab: Marine, not rare (2049, p367), Deep water form (2567, p17), (2572, p49)

Misc: No commercial value (2567, p17), (2572, p49), (2390), Parasites Humboldt Bay (3382)

Family: Carcharhinidae--Requiem sharks

Galeorhinus zyopterus Jordan and Gilbert - (soup-fin shark), (2049, p367), (2567, p20), (2390), (2572, p55), (2571, p53)

Dist: B.C., Vancouver Island to Calif., Abreogos Pt. (2049, p367)

Coll: B.C.: Banks Island, Sooke (2390), Vancouver Island near Nanaimo. Wash: Puget Sound region, Ore: Coastal, off Coos Bay (2049, p367)

Remarks: Males predominate from Vancouver to Point Arena (No. Calif.) Males are equal to females from Pt. Arena to San Luis Obispo, most females found in south where conditions are favorable for growth of young (2572, p24) Eat: flatfish, rockfish, midshipman, sardines, mackeral, barracuda, and squid. (2572, p55)

Misc: No longer of commercial value in this region. (2049, p367), (2567, p20), (2571, p53), formerly a good source of Vit. A. (2572, p55), Humboldt Bay: parasite(3382)

Prionace glauca (Linnaeus) - (blue shark) (2341), (2567, p21), (2572, p56), (2390), (5509)

Dist: B.C. to Gulf of California

Coll: B.C.: Vancouver Island (2390), Ore: (2341)

Hab: High seas and inshore waters. Prefer warm currents. (2567, p21) Eat small fish and squids (2572, p56)

Remarks: Stomach contents of *Oncorhynchus* sp., *Brama raii*, *Cololabis saira*, *Myctophidae*, *Anotopterus pharo*, squid, shrimp, and salps (*Salpa fusiformis* Cuvier). Will eat salmon selectively when there is an abundance (5509).

Misc: No commercial value (2567, p21), (2572, p56)

Triakus semifasciata Girard - (Leopard shark) (2567, p17), (2572, p51)

Dist: Oregon to Magdelena Bay, Baja Calif.

Hab: Found in bays and shallow water.

Misc: Some commercial value (2567, p17), (2572, p51)

Family: Squalidae--Dogfish shark

Somniosus pacificus Bigelow and Schroeder - (sleeper shark), (2572,p62), (2390)

Dist: N. Pacific to s. California, Japan (2572,p62);(2390)

Hab: A bottom dweller

Misc: Eats any animal life of a suitable size and carrion (2572,p62) (2390), No commercial value (2577,p62); (2390)

Squalus acanthias Linneaus - (grayfish) (2049,p368), (3804,p89), (dogfish shark) (2567,p23),(2571p52),(2572,p61),(5591),(5639,p218)

Synonym Squalus ruckleyi

Dist: Alaska to Santo Tomas, Baja Calif. China and Japan, North Atlantic (2567,p23)

Coll: Wash: Puget Sound region: Pt. Steilacoom. Pt. Ludlow. Hoods Canal, San Juan Isl. (2049,p368), Neah Bay, Cape Flattery, Cape Johnson, Grays Harbor, La Push (2049,p368) Willapa Bay (2390), Ore: Tillamook Head (2049,p368), Japan: Honshu Is. (2390)

Hab: Marine, abundant (2049,p363) Inshore waters and deeper waters in southern Calif. (2567,p23). In 1923, experiments on 2 females, showed death temps., of between 28.5°C and 29.1°C (5591). Feeds a lot on hake in California waters (5639). Parasites--Humboldt Bay (3382). Travel in schools, eat herring anchovy, smelts, also crabs and squid.

Misc: Common. Little commercial value. (2567,p23), considerable commercial value; destructive to other fish. (2049,p368)

Squalus suckleyi (Girard) - (grayfish, dogfish shark) (2049,p368), (3804,p89)

See also Squalus acanthias. Note: This name (Squalus suckleyi) is not presently accepted.

Family: Squatinidae--Angel sharks

Squatina californica Ayres - (California angel shark) (2567,p24),(2049,p368), (2572,p64)

Dist: S. Alaska to Gulf of California. Rare in the north, common in southern California.

Squatina californica (continued)
Coll: Wash: Puget Sound region, near Seattle (2049, p368)
Hab: Inshore bottom dweller (2567, p24), (2572, p64)
Misc: No commercial value. (2567, p24), (2049, p369), (2572, p64)

Order: Rajaformes
Family: Torpedinidae--Electric rays

Torpedo californica Ayres - (electric ray)(2574, p79), (2390)
Tetranarce californica (Ayres) (old name)--(torpedo, crampfish) (2049, p369)
Dist: B. C., Nootka Sound and Vancouver Isl. (2049, p369) to southern California in moderate depths (2574, p79)
Coll: B. C.: Kyuquot, Nootka, Cowichan Bay, Sattalite Channel, Saanich Arm. Wash: coastal, Puget Sound, Pt. Susan, Cape Flattery (2049, p369)
Hab: Marine

Family: Rajidae--Skates

Raja binoculata Girard - (big skate) (2049, p368), (2567, p27), (2574, p70), (2390), (5510), (3804, p90)
Dist: Sitka, Alaska to San Diego Bay. (2567, p26), (2574, p70), (2390)
Coll: Wash: Coastal, Albatross Station 3450; Cape Flattery; Cape Johnson; La Push; Shoalwater Bay (Willapa Harbor) Puget Sound region: Seattle; Pt. Ludlow; Hoods Canal; San Juan Islands (2049, p368). Ore: Yaquina Bay; Coos Bay. (2049, p368)
Hab: Marine (2567, p26), (2574, p70), (2390)
Misc: Skates are oviparous. Eggs covered with leathery case (5510). Found in shallow to moderate depths, sometimes in water only a few feet deep, over mud flats, eats crustaceans and fish. Dredged 5-15 fms off Central Oregon (3412). Egg case anatomy (5510)

Raja inornata Jordan and Gilbert - (California sakte) (2049, p368), (2567, p26), (2574, p69)
Dist: St. Juan de Fuca to Turtle Bay, Baja Calif. (2049, p368)
Coll: Wash: Puget Sound: St. Juan de Fuca (2049, p368), Rare northward.

Raja inornata (continued)
Hab: Inshore muddy bottoms. Known from considerable depths (2574,p69)
Misc: No commercial value. (2049,p368). Most important skate in commercial catch. (2567,p26)

Raja kincaidii Garman - (black skate) (2049,p368),(2574,p74),(2390)
Dist: B.C. to southern California (2574,p74)
Coll: B.C.: Trincomali Channel, Porcher Island (2390)
Wash: Puget Sound: Friday Harbor (2049,p368)
Hab: Marine, rare, only one speciman known (2049,p368),(2390)

Raja rhina Jordan and Gilbert - (long-nosed skate, sharp nosed skate) (2049,p368),(2567,p27),(2574,p71),(2390)
Dist: Alaska to Point Loma, California
Coll: Wash: Puget Sound region: Seattle, off Everett, Hoods Canal, Saratoga Passage, San Juan Islands, Orcas Is. (2049,p368)
Hab: Marine
Misc: Common, slight commercial value (2049,p368),(2567,p26), (2574,p70),(2390)

Raja stellulata Jordan and Gilbert - (prickly skate, starry skate) (2049,p368), (2574,p73),(2390)
Dist: Unalaska to southern California. (2049,p268),(2574,p73),(2390)
Coll: B.C.: Port San Juan, 48°30'N, 126°36'W(2390)
Wash: Puget Sound, San Juan Islands; Upright Channel; St. Juan de Fuca (2049,p368)
Hab: Marine (2574,p73)
Misc: Not rare, no commercial value (2049,p368),(2574,p73), (2390)

Family: Dasyatidae--Stingrays

Dasyatis dipterus Jordan and Gilbert (diamond stingray) - (2567,p28), (2574,p76),(2390)
Dist: B.C. to Central America, perhaps to Peru. Common. (2567,p28),(2574,p76),(2390)
Hab: Bays and on beaches from San Diego south (2567,p28) (2574,p76)
Remarks: Eats crabs and molluscs.

Family: Myliobatidae--Eagle rays

Myliobatis californicus (Gill)
Holorhinus californicus Gill (obsolete name) (bat stingray) (2567,p29), (2574,p78)
Dist: Oregon to Gulf of California. Common (2567,p29),(2574,p78)
Hab: Inshore, bays and sloughs (2567,p29),(2574,p78)
Remarks: Feeds on oysters and is commonly seen around commercial beds (2574,p78)

Order: Chimaeriformes
Family: Chimaeridae--Chimaeras

Hydrolagus colliei (Lay and Bennet) - (ratfish, chimaera) (2049,p369), (2567,p30),(2574,p82),(2390)
Dist: Alaska to Santo Tomas, Baja Calif. (2049,p369),(2567,p30), (2574,p82), (2390)
Coll: Wash: Coastal, Tatoosh Is., Albatross Station 3790; Cape Flattery Destructions Is.; Grays Harbor, Puget Sound region: Ft. Steilacoom; Seattle; Whidby Is., Hoods Canal near Holly; Pt. Townsend; Discovery Bay; San Juan Islands, St. Juan de Fuca, Ore: Coastal, off Yaquina Head; off Newport, Heceta Bank, and off Coos Bay (2049,p369)
Hab: Marine, shallow water in north, deep water in south. (2567,p30)
Remarks: Eats mussels, invertebrates and some fish. (2390) Abundant, no commercial value (2049,p369),(2567,p30), (2574,p82), (2390)

Class: OSTEICHTHYS
Order: Acipenseriformes
Family: Acipensiridae--Sturgeons

Acipenser mediarostris - (green sturgeon) (2591),(2390),(5645)
Acipenser acutirostris Ayres - (green sturgeon) (2049,p369)
Dist: Gulf of Alaska to southern California (5645), North Pacific southward to Monterey Bay. (2049,p369)
Coll: Wash: Puget Sound region (2049,p369),Ore: Coastal, Astoria, Siuslaw R.,Yaquina Bay, Coos Bay, Klamath R., (2049,p369)
Hab: Marine and freshwater.
Remarks: Migrate long distances along coast at times (5645)
Misc: Not abundant. Slight commercial value (2049,p369)

CHORDATA - FISHES - Acipensiridae

Acipenser transmontanus Richardson - (white sturgeon) (2049,p369), (2571,p33-34),(2390,p96-97), (5645)

Dist: Alaska to Monterey, California (2049,p369)

Coll: Wash: Puget Sound, St. Juan de Fuca (2049,p369), Chinook, Kalama, Vancouver, Ft. Vancouver, Ore: mouth of Columbia R. (2049,p369)

Hab: Marine and freshwater (2049,p369)

Misc: Once abundant, now much depleted. Considerable commercial value maximum weight 1,285 lb. (2571,p33,34),(2390), Spawns in spring and early summer. Enters rivers to spawn. Slow and sluggish. Lives on the bottom, stirring up mud and debris with snout to find food. Eats crustaceans and other invertebrates in the sea and eulachons in Fraser R. (2390,p96-97)

Order: Clupeiformes
Family: Clupeidae--Herrings

Alosa sapidissima (Wilson) - (shad) (2049,p369),(2567,p34),(2571,p22,32-33), (5621),(2390,p103-104),(5544),(5614),(2427)

Clupea sapidissima (obsolete name) (2427)

Dist: Southeastern Alaska to Monterey (2049,p369),(2567,p34), (2390)

Coll: Wash: Seattle, Upright Channel, Grays Harbor, Columbia River mouth, Ore: Coastal Yaquina Bay, Coos Bay, Rogue River (2049,p370)

Hab: Marine and freshwater, caught in May, June, July during spawning migrations (2571,p33), ascends rivers to spawn. Young hatch in 7-10 days. Feed on plankton (2390). Young migrate to sea after 5-6 mos.

Remarks: Introduced in 1871 to West. Abundant, introduced, slight commercial value in this area (2049,p369),(2567,p34), (2390), In experiments to determine effect of abrupt transfer of salt water and vice versa at different temperatures: Adults survived changes between salt and fresh at same temperature an at 16°F difference. No tolerance at 25°F. Juveniles survived changes from salt to fresh over range of 55° to 70°F. No tolerance for fresh to salt over the same range. (5614).

Clupea harengus pallasi Cuvier and Valenciennes - (Pacific herring) (2571),(5530),(5529),(3635)?,(5681),(2575,p365-72), (2049,p369),(3804),(5640),(5507),(5621),(2390),(2444), (2567,p34)

Clupea pallasii (obsolete name.) Also under *Clupea mirabilis* in old literature (2423), (5664), (5663), (5665), (5666), (5667), (5668),(5669),(5660),(5661),(5670),(5671),(5672),(5673), (5674),(5675), (5676),(5677),(5678),(5679),(5680),(5682), (5683),(5684),(5685),(5686),(5687),(5688),(5689),(5690), (5691),(5692),(5693).

Dist: Bering Sea, Kamchatka to California (2049,p369),(2567,p34), (2390),(5621)

Coll: Wash: Steilacoom, Seattle, Hoods Canal, Holmes Harbor, Discovery Bay, Port Angeles, Utsaladdy, San Juan Islands, Cape Flattery; Ore: Tillamook Bay, Yaquina Bay, Coos Bay (2049,p369)

Hab: Marine (2049,p369), Enter bays in winter and spring to spawn (2567,p34)

Misc: (2049,p369),(2567,p34),(2390),(5621),(2444), (5680),(5665), (5666)

Biol: (5529),(5530),(3635),(2390,p99-100),(5507,p1067),(3804), (2444),(5678),(5682),(5684),(5668),(5673)

Physiol: (2575,p367),(5530),(5524),(5684),(5689),(5690),(5691), 5692),(5693),(5660)

Ecology: (5530),(5524),(5681),(2390,p99-100),(5674),(5678),(5680), (5682),(5669),(5661),(5671)

See also Vol. I, Chap. 20.

See also Chapter 20
p. 251

Sardinops sagax (Pacific sardine) (2571),(2390), (pilchard),(2049,p370), (2567,p33),(2593),(2473),(5536),(5537),(5540),(5621), (2700)

Sardinops caerula (obsolete name)

Clupea sagax (in old literature) (2423)

Sardina caerula (in very early studies)

Dist: British Columbia to Gulf of California (2049,p370), (2567,p33),(5621), (2390)

Coll: B.C.: Nanaimo (2390), Wash: Seattle, Utsaladdy, off entrance to Strait of Juan de Fuca, Shoalwater Bay, Ore: Astoria, Yaquina Bay, Siuslaw River, Coos Bay (2049,p370)

Remarks: Most abundant clupeoid on Pacific coast (5621), great commercial value (2049)

See also Chapter 20
p. 291

Sardinops sagax (continued)

Misc: Growth, migration, tag studies, abundance, importance, (2390,p102-103),(5536),(3638),(5537),(2049,p370),(5621)

Biol: (2049,p370), (5693),(2473),(5540),(2700)

Paras: (2473),(2700)

See also Vol. I, Chap. 20.

Family: Engraulidae--Anchovies

Engraulis mordax Girard (northern anchovie) (2341),(2567,p36),(5704),(5705),(5703),(2571,p41-42),(2390,p104-105),(5702),(5701),(5700),(5699),(5698),(5697),(5696),(5695),(5694),(5621)

There are two subspecies: *E. mordax mordax*, ranging from B. C. to Baja Calif. and *E. mordax nanus* found only in San Francisco Bay area (5621)

Dist: Vancouver Is., B. C. to Baja Calif. (2571,p42)

Coll: B. C.: Vancouver Island, Barkley Sound, Strait of Georgia, Port Hardy (2390)

Misc: Important commercially as bait for albacore. Could be more important in future (2571,p42)

Remarks: Spawn in July and August. Eat plankton crustaceans. (2390). Shrimps and anchovy main food of *Roccus saxatilis* in San Francisco Bay in summer and fall. (5695). Paired light exper. (5704), Tag exper., (5703),(5706) Biol: (3638), Maristic characteristics indicates 3 populations in N. Pacific (5696). Number of eggs spawned in one batch estimated to be 574/gm. of total weight of female. Biomass of commercial catch. Male = 75% of female biomass. It is not known how many times female spawns. (5707). Mainly used for bait. Southern Calif. fish smaller than north. Lives up to 7 yrs. 50% females reach maturity in 2-3 years, most have reached it by 4 yrs. (5694)

See also Vol. I, Chap. 20.

Engraulis mordax mordax Girard (Northern anchovy) (2049,p370),(2567,p36),(5621),(5694)

Dist: Vancouver Island to Lower California. (2049,p370),(2567,p36),(5621)

Engraulis mordax mordax (continued)
Coll: Wash: Coastal, off Copalis; Grays Harbor; Shoalwater Bay (2049,p370), Puget Sound, Alki Pt., Seattle; Hoods Canal; Utsaladdy (2049,p370), Ore: Coastal, Tillamook Bay; Yaquina Bay; Coos Bay, Astoria, Columbia River mouth, (2049,p370)
See also Vol. I, Chap. 20.

See also Chapter 20 p. 259

Family: Salmonidae--trouts, whitefish, grayling

See also Chapter 20 p. 277

Oncorhynchus gorbuscha (Walbaum) - (pink salmon, humpback salmon) (2049,p370),(2571,p22),(2390),(3804),(2420),(5681),(2771)
Dist: Northern Japan to Alaska to California (2049,p370)
Coll: Wash: Seattle, San Juan Isl., Willapa Bay, Ore: Deschutes River (2049,p370),(2571,p22)
Misc: (5656)
Biol: (2390,p106),(2771),(2049,p370),(3804),(5681),(5656)
Phys: (2390,p106),(2771)
Ecology: (5681)
See also Vol. I, Chap. 20.

Oncorhynchus keta (Walbaum) - (chum salmon, dog salmon) (2049,p370), (2571,p22),(2390),(2771),(2420),(3635)
Dist: Kamchatka, Bering Sea, to California (2049,p370),(2390)
Coll: Wash: Fort Steilacoom, New Dungeness, Duwamish River, Cedar River, Hoods Canal near Holly, San Juan Islands, Neah Bay, Chehalis (2049,p370), Ore: Below mouth of Willamette River, all larger streams (2049,p371)
Remarks: Abundant.
Hab: Marine and freshwater
Misc: Great commercial value (2049,p370),(2390)
Biol. and Phys: (2390),(2771)
See also Vol. I, Chap. 20.

Oncorhynchus kisutch (Walbaum) (silver salmon, dog salmon, hoodbill, silversides, jack salmon) (2049,p371),(3804),(2341), (2420),(5507),(5513),(2390),(2567,p42),(2571,p22)
Dist: Japan to Alaska to Mexico (2049,p371),(2575,p365-372), (2567,p42),(2390)
Coll: Wash: Seattle, Duwamish River and Lake Union, Lake Washington, Green Lake, Hoods Canal near Holly, San

Oncorhynchus kisutch (continued)
Juan Islands, Port Angeles, Cape Johnson, Dickey River, Quillayute River mouth. Ore: Coastal, St. Helens, Scappoose, Clackamas R., Wallowa R., Lostine R., Nehalem R., Nestucca R., Alsea R., Siuslaw and Tsiltcoos Rivers, Butte and Tahkenitch Creeks, Elk Cr., near Cannon Beach, Port Orford, Rogue R. near Medford (2049, p371)
Hab: Marine and freshwater
Misc: Abundant. Great commercial value (2049, p371)
Physiol: (2575, p367-68), (2390, p106)
Biol: (2390, p106), (3804), (5507)
See also Vol I, Chap. 20.

Oncorhynchus nerka (Walbaum) - (red salmon, sockeye salmon, blueback salmon) (2049, p371), (2571, p22), (3635), (2390, p120-121), (5513), (2420)
Dist: Japan to Alaska to California (2049, p371), (2390)
Coll: Wash: San Juan Islands, Quinault R., Ore: Astoria (2049, p371)
Hab: Marine and freshwater (2049, p371)
Misc: Abundant, very great commercial value (2049, p371), (2390), (5656)
Biol: (5656), (5513), (3635)
Phys: (5513)
See also Vol. I, Chap. 20.

Oncorhynchus tshawytscha (Walbaum) (king, chinook, or spring salmon) (2049, p371), (2341), (5669), (2428), (3804), (5507), (2390), (2567, p40), (2571, p22)
Dist: Northern China to Alaska to California. (2049, p371), (2567, p40) (2390)
Coll: Wash: Pt. Gamble, Pt. Townsend, San Juan Islands (2049, p371-2) Cape Flattery, Grays Harbor, Willapa Bay. Ore: New Columbia River mouth, Tillamook Bay (2049, p372)
Hab: Marine and freshwater (2049, p371)
Misc: Abundant, very great commercial value (2049, p371), (2567, p40) (2390)
Biol: (2390), (5507), (5513), (5669)
Phys: (2390), (5513)
See also Vol. I, Chap. 20.

See also Chapter 20
p. 277

Salmo clarkii clarkii Richardson - (coastal cutthroat trout, Columbia River trout) (2049,p372),(2567,p43) (2390,p111)

Dist: B.C. to California (2049,p372)

Coll: Wash: Puget Sound, Hoods Canal near Holly; Pt. Townsend; Cape Flattery; Dickey R., Shoalwater Bay, Lakes and streams, Ore: Coastal, Lakes and streams; Elk Cr. near Cannon Beach, Coos Bay.

Hab: Freshwater and marine (2049,p372)

Biol: (2390)

Misc: Abundant, considerable commercial value (2049,p372)

Salmo gairdnerii gairdnerii Richardson (rainbow trout, steelhead trout, salmon trout, half pounders, summer salmon, hardhead) (2049,p373),(2420), (2567,p43),(2571,p22),(2390,p109-11), (5555),(5582)

Dist: Alaska to Baja California (2049,p373),(2567,p43),(2390)

Coll: Wash: Seattle, Hoods Canal near Holly, San Juan Islands; Str. of Juan de Fuca, coastal, Cape Flattery, Willapa Bay, Columbia River drainage mouth, Ore: Coastal (2049,p373)

Biol: Anadromous. Eat crustaceans, herring, squid and other fishes (2390).

Phsiol: (5555) Study done on hatching. (1-2 yr. old fish) revealed temp. altered albumin, alpha -1 and beta - flobulin in blood. Effects is on liver where they are synthesized. Oxygen consumption of liver is greater at 8°C than at 16°C. Meaning liver metabolism is greater at lower temp. Photo period had no effect on these specimens. Presumably because they had not reached sexual maturity (5582). Length of photoperiod. Showed little effect on metabolic rate of exised brain, liver and gill tissue. Brain showed com-plete metabolic compensation, $Q\,O_2$ at 8° C = $Q\,O_2$ at 16°C. Liver showed overcompensation. $Q\,O_2$ at 8°C > $Q\,O_2$ at 16°C. No compensation occurred in gill tissue indicating that perhaps the fill is adequate to handle all of the body's oxygen needs.

Salvelinus malma Walbaum (2390,p112),(2421)

Salvelinus malma spectabilis (Girard) - (Dolly Varden trout, bull trout, western charr) (2049,p374),(2390)

Dist: (marine only) Coastal streams from Alaska to Northern California (2049,p374)

Salvelinus malma (continued)

Coll: Wash: Puget Sound region, Puyallup, Duwamish, and Lummi River, Seattle, Skagit R., coastal, Grays Harbor, Ore: Coastal (2049, p374)

Hab: Freshwater and marine (2049, p374)

Remarks: Spawns in autumn in streams; food consists of insects, crustaceans, fishes including herring, sticklebacks, young salmon and salmon eggs.

Misc: Abundant, slight commercial value (2049, p374)

Family: Osmeridae--Smelts

Allosmerus elongatus (Ayres) (White bait smelt) (2567, p38)

Dist: St. of Juan de Fuca to San Pedro (2567, p38)

Coll: Oregon (2341)

Misc: Minor commercial importance

Hypomesus pretiosus (Girard) - (silver smelt, surf smelt) (2049, p375), (2033, p320), (5538), (2390), (2567, p39), (2341)

Dist: Alaska to central California (2049, p275), (2567, p39), (2390)

Coll: Coastal, Puget Sound region, Seattle, Utsaladdy; Pt. Townsend; San Juan Islands; Pt. Angeles; (2049, p375), Beach at La Push; Beach at mouth of Cedar Cr. (2049, p376), Ore: Columbia River mouth, coastal, Tillamook Bay; Nestucca Bay, Yaquina Bay; Yachats; Siuslaw R., Coos Bay (2049, p376)

Misc: Abundant, considerable commercial value (2049, p375)

Hab: Marine, Surf smelt (2044, p320)

Spawning: From June to September on sandy beaches (2390, pl26) Spawn where there is fresh water seepage through gravel. Usually, at high and falling tide. In summer, eggs hatch in 10-11 days; in winter it is longer. (5538). Spawn most months of the year on exposed beaches and at heads of sheltered bays. Surf covers eggs attached to gravel with a layer of sand to prevent drying out. In summer's, spawning on shaded beaches where day temp. is cooler.

Predators: Eaten by chinook salmon and other fishes (2390, pl26) Do not seem to be a favored fish for predators. (5538)

Feeding: Eat mainly crustaceans: euphasids, shrimp larvae and amphipods.

Osmerus dentex Steindacher - (Arctic smelt, toothed smelt) (2390,p126-7)
Dist: Bering Sea to Vancouver Island

Spirinchus dilatus Schultz and Chapman - (Longfin smelt, Puget Sound smelt) (2390,p124),(5538),(2049,p375)
Dist: North B. C. to North Calif. (2049,p375)
Coll: B. C.: Burrard Inlet and Harrison Lake (2049,p375) Wash: Puget Sound region: Saratoga Passage, off Camano Is., Mouth of Nooksack R., San Juan Is., coastal Albatross Station 2868 (off Teawhit Pt. south of La Push, 31 fm), Ore: Columbia River mouth, Astoria, coastal Albatross Station 3060 (off Tillamook Head, 28 fms). (2049,p375)
Hab: Marine and Freshwater
Misc: Common, some commercial value as food (2049,p375) Inhabits water of 10-70 fms; spawns in streams near ocean; spawn from October to December. Food consists of small crustaceans. Spawns in fresh water. Young seem to spend much time in freshwater before descending to ocean. Very little economic importance (5538).

Spirinchus starksi (Fish) - (night surf smelt) (2049,p375),(2033,p320), (2567,p38),(5520)
Dist: La Push, Washington south to Monterey Bay, California.
Coll: B. C.: (5520), Wash: Coastal, Beach at La Push; Cedar Cr. Beach, Ore: Coastal, Yaquina Head; Yaquina Bay, (2049,p375)
Hab: Intertidal (2044,p320), marine
Misc: Abundant, slight commercial value (2567,p38)

Thaleichthys pacificus (Richardson) - (Columbia River smelt, eulachon, oollachan, candle fish) (2049,p375),(2341),(2567,p39), (2571,p22,33),(5538)
Dist: Bering Sea to California
Coll: Wash: Puget Sound region, Seattle (probably from market), off Camino Is. Ore: Columbia River drainage, coastal, (2049,p375)
Hab: Marine and Freshwater
Misc: Common, great commercial value (2049,p375),(2567,p39) Enter Columbia R. in the winter in dense schools (2571,p33) Spawning migration takes place from mid-March to mid-May. Males move into the rivers first, then females. Eggs attached to coarse sand. Larvae carried to sea shortly after

hatching. Adults eat euphasids, and are an important link in food chain. They are eaten by sturgeon, halibut, cod, porpoise, finback whale, seals and sea lions. It is a good fish and is also used to feed fur bearing animals. (5538)

See also Chapter 20
p. 300

Family: Bathylagidae--Deepsea smelt

Bathylagus milleri Jordan and Gilbert (stout blacksmelt) (2341),(2390,pl30)
Dist: Bering Sea to southern California (2390)
Coll: B.C.: 51°44'N, 131°17'W at 216-324 fms (2390), Ore: (2341)

Bathylagus ochotensis Schmidt (2341)
Dist: Oregon (2341)

Bathylagus wesathi Bolin (2341)
Dist: Oregon (2341)

Leuroglossus stilbius Gilbert (California smooth tongue) (2341,(2390,pl98)
Dist: Gulf of Alaska to southern California (2390)
Coll: Ore: (2341)

Nansenia candida Cohen (Deep sea smelt) - (2341)
Dist: Oregon (2341)

Family: Opisthoproctidae--Barreleye

Macropinna microstoma Chapman (Barrel eye) (2341),(2390,pl31-2)
Dist: Alaska to southern California (2390)
Coll: B.C.: 54°22'N, 132°18'W at 54-143 fms, 53°50'N, 134°20'W at 379-487 fms(2390), Ore:(2341)

Family: Paralepidae--Barracudinas

Lestidium ringens (Jordan and Gilbert) - (Slender barracudina) (2341), (2390,pl53-4)
Dist: B.C. to California (2390)
Coll: Ore: (2341), 49°08'N, 127°25'W at 16 fms, 51°N, 130°W at 27 fms (2390,pl54)

Notolepis coruscans (Jordan and Gilbert) - (Ribbon baracudina)
(2341), (2390,pl 54-5)
Arctozenus coruscans
Dist: Straits of Juan de Fuca to Calif. (2390,pl 55)
Coll: Ore (2341)

Family: Anotopteridae--Daggertooths

Anotopterus pharao Zugmayer - (daggertooth) (2390,pl 55-6)
Dist: Bering Sea to Calif. (2390)
Remarks: Rare, stomach contents found in albacore, blue shark, steelhead, and pomfret (2390)

Order: Mytophiformes
Family: Mytophidae--Lanternfishes

Ceratoscopelus townsendi (Eigenmann and Eigenmann) (fangtooth lanternfish)
(2341) (2390,pl49-50)
Dist: B. C. to southern Calif. (2390)
Coll: Ore: (2341), 48°58'N, 144°21'W at 16 fms (2390)

Diaphus theta Eigenmann and Eigenmann - (theta lanternfish) (2341)
(2390,pl44 - 5)
Dist: Gulf of Alaska to southern Calif. (2390)
Coll: Wash: coastal, from 17-584 fms; Ore: (2341)
Remarks: Adults have been obtained in salmon stomachs.

Lampanyctus idiostigma Parr (2341)
Coll: Oregon (2341)

Lampanyctus jordani Gilbert (2341)
Coll: Oregon (2341)

Lampanyctus microchir Gilbert (2341)
Coll: (2341)

Lampanyctus nannochir (Gilbert) (2049,p64)
Dist: North Pacific Ocean in deep water (2049,p64)
Coll: Wash: Coastal, Albatross Stations 3071 and 3072 (2049,p64)
Remarks: Rare, no commercial value (2049,p64)

Lampanyctus pyrsobolus Alcock (2341)
Coll: Oregon (2341)

Lampanyctus ritteri Gilbert - (broadfin lanternfish) - (2341),(2390,pl48-9)
Dist: British Columbia to California (2390)
Coll: Ore: (2341); 49°06'N, 127°16'W at 122 fms (2390)

Myctophum californiense Eigenmann and Eigenmann - (bigfin lanternfish) (2049,p64),(2390,pl43-4)
Dist: Washington to California (2049,p64),(2390)
Coll: Wash: Puget Sound region (2049,p64), Vancouver Isl., at 17 fms and in surface waters (2390)
Hab: Marine (2049,p64)
Remarks: not common, no commercial value (2049,p64)

Notoscopelus resplendens Richardson (patchwork lanternfish(- (2390,pl50-1)
Dist: British Columbia to California (2390)
Coll: 49°24'N, 140°38'W at depth 16 fms (2390)

Stenobrachius leucopsarus (Eigenmann and Eigenmann) (2341) (small fin lanternfish)
Lampanyctus leucopsarus (Eigenmann and Eigenmann) - (2049,p64), (2390,pl45-6)
Dist: Alaska to California (2049,p64),(2390),(2341)
Coll: Wash: Coastal, Albatross Station 3343 (2049,p64), 52°39'N, 132°38'W, depth 1,588 fms.
Hab: Have been taken from Juan de Fuca Strait to Alaska from 17-650 fms. Occasionally found in salmon stomachs (2390)
Remarks: Rare, no commercial value (2049,p64)

Tarleton crenularis (Jordan and Gilbert) - (blue lanternfish) (2341), (2390,pl41-2)
Dist: S.E. Alaska to southern California (2390)
Coll: Wash: Juan de Fuca Strait 48°00'N, 125°41'W at 173-260 fms (2390), Ore: (2341)

Family: Alepisauridae--lancetfishes

Alepisauris borealis Gill - (Pacific lancetfish) (2567,p43),(2390,pl56-7)
A. richardsoni (synonym)
Dist: Alaska to equator (2567,p43),(2390)
Remarks: Not rare (2567,p43),(2390) seems to be an inhabitant of deep water. Individuals have eaten: squid, octopi, herring, lanternfishes, hake, rockfishes, soft sculpins (Gilbertia sigulates) poachers and spring lumpsuckers (Eumicrotemus orbis) (2390)

Alepisaurus ferox Lowe (lancetfish) (2049, p64)
Dist: North Atlantic and North Pacific Oceans (2049, p64)
Coll: Wash: Coastal, Puget Sound region, off cape Johnson, Grays Harbor (2049, p64)
Hab: Marine
Remarks: Not rare, no commercial value (2049, p64)

Alepisauris richardsoni Bleaker
see also Alepisauris borealis Gill

Order: Anguilliformes (Apodes)
Family: Nemichthyidae--snipe eels
Note: This family inhabits deep water.

Avocettina gilli (Bean, 1890) (snipe eel), (2341), (2390, p159-60)
Dist: Alaska to Oregon (2390), (2341)
Coll: Ore: (2341)

Nemichthys avocetta Jordan and Gilbert - (thread eels, snipe eels) (2049, p376), (2390, p160-161)
Dist: Washington to Oregon (2049, p376), (2390)
Coll: Wash: Puget Sound region, Port Gamble, Waldron Is. (2049, p376), Ore: Coastal, Heceta Bank (2049, p376)
Hab: Marine (2049, p376)
Remarks: Rare, no commercial value (2049, p376), (2390)

Nemichthys scolopaceus Richardson (2341)
Dist: Oregon (2341)

Order: Beloriformes
Family: Scomberesocidae--Sauries

Cololabis saira (Brevoort) - (Pacific saury) (2049, p64), (2341), (2567, p43), (2390, p158-9), (5527)
Dist: North Pacific, Japan to Alaska to California (2049, p64)
Coll: No record from Washington or Oregon but taken off Vancouver Island and in California (2049, p64)
Hab: Marine (2567, p43)
Misc: Not rare, no commercial value (2049, p64)
Remarks: Diet: fish of marlin and albacore (2567, p43), (2390)
eat fish eggs and larvae. Larvae are pelagic (2390)
Predators include California sea lion and blue shark (5527)

Family: Malacosteidae

Aristostomias scintilans Gilbert - (loosejaw) (2341),(2390,pl37-8)
Dist: B.C. to California (2390)
Coll: Ore: (2341),50°21'N, 138°44'W depth 16 fms (2390,pl37-8)

Family: Chaeliodontidae--Viper fish

Chauliodus macouni Bean - (fanged viper-fish) (2049,p376),(2341) (2390,pl38-9)
Dist: Queen Charlotte Islands, B.C. to California (2049,p376 (2390)
Coll: B.C.: 51°23'N, 130°34'W at 876 fms also 40 fms at mouth of Fraser River (2390), Ore: Coastal, Albatross Station 3347 (2049,p376)
Hab: Marine (2049,p376)
Remarks: Eats arrow worms, Saggita and shrimp (2390) Not rare, no commercial value (2049,p376)

Order: Gadiformes (Anacanthini)
Family: Gadidae--codfish and hakes

Gadus macrocephalus Tilesius - (Pacific codfish, gray cod) (2049,p65), (2567,p49),(2390,pl65-166),(5502),(5515),(5517)
Dist: Bering Sea to Oregon (2049,p65),(2567,p49)
Coll: Wash: Puget Sound region, Seattle, Pt. Townsend, Discovery Bay, San Juan Islands, Pt. Angeles, St. of Juan de Fuca, Coastal, Neah Bay, Cape Flattery, Ore: Coastal, Yaquina Bay (2049,p65)
Habit: Marine
Remarks: Abundant, commercial value (2049,p65),(2567,p49) Seasonal migration from deep to shallow water in spring. Spawning in late winter. Eggs are pelagic. Feed near bottom herring, sandlance and crustaceans (2390)
Temp: Hatching of eggs at 11°C was most rapid (8.5 days) but was least successful. Hatching most successful at 5°C (17 days).(5502) No relationship found between climatic temperature and abundance of cod.(5515); (5517)

Microgadus proximus (Girard) - (Pacific tomcod) (2049,p65),(2341), (2567,p49),(2390,pl65-165)
Dist: Alaska to California (2049,p65),(2567,p49),(2390)

Microgadus proximus (continued)
Coll: Wash: Puget Sound region, Seattle, Pt. Ludlow, Saratoga Passage, San Juan Is., Pt. Angeles, Coastal, Cape Flattery, La Push, off Cape Johnson and Willapa Bank, Ore: Coastal, Astoria, Tillamook Head and five miles south of Cape Falcon, Yaquina Bay, Yaquina Head (2049, p65)
Hab: Marine (2049, p65)
Remarks: Common, slight commercial value (2049, p65)

Theragra chalcogramma fucensis (Jordan and Gilbert) - (walleye pollock, Puget Sound pollack, whiting) (2049, p65), (2390, pl 63-164)
Dist: Washington (2049, p65), (2390)
Coll: Wash: Puget Sound region, Meadowdale, Possession Sd., Saratoga Passage, San Juan Is. (2049, p65), Coastal, Cape Flattery (2049, p65)
Hab: Marine (2049, p65)
Remarks: Abundant, slight commercial value (2049, p65), used as mink food. Eats crustaceans, herring and sandlance (2390)

Merluccius productus (Ayres) - (Pacific hake) (2049, p65), (2567, p48), (2390, pl 62-3), (5639, p218)
Dist: Alaska to Gulf of California (2049, p66), (2567, p48), (2390)
Coll: Wash: Puget Sound region, Duwamish Head, Seattle, Possession Sound, Saratoga Passage, San Juan Islands, Coastal off Grays Harbor, Columbia R. mouth, Chinook, Ore: Coastal off Tillamook, Astoria, off Newport, and off Heceta Head, Tillamook Head, 5 miles south of Cape Falcon, Yaquina Head, off Cape Perpetua, Heceta Bank, off mouth Siuslaw R., Yaquina Bay, off Yaquina Head (2049, p66)
Hab: Marine (2049, p65)
Remarks: Common, slight commercial value (2049, p66), eats small fish and squids (2390) Eaten by dogfish shark, Squalus acanthias (5639), See (2637) for fecundity study, see also Vol. I, Chap 20.

See also Chapter 20
p. 269

Order: Gasterosteiformes
Family: Gasterosteidae--Sticklebacks

Gasterosteus aculeatus Linnaeus - (common three-spined stickleback) (2049, p69), (2390, p353-4), (5500)

Dist: Europe, Asia and North America

Coll: Puget Sound region: Seattle, Meadowdale, Hoods Canal near Holly, Pt. Ludlow, San Juan Islands, Str. of Juan de Fuca. (2049, p69), Wash: Neah Bay, Cape Flattery, La Push, Quinault R. mouth, Grays Harbor, Shoalwater Bay (Willapa) (2049, p69), Columbia River Drainage, mouth (2049, p69), Ore: Coastal, All freshwater streams, Tillamook Bay, Siuslaw River and outlet of Siltcoos L., Elk Cr. near Cannon Beach (2049, p69)

Hab: Marine, brackish and entering fresh water, (2049, p69),

Remarks: Found in small schools particularly around wharves and eelgrass. Eats largely small crustaceans. (2390) Common, no commercial value (2049, p69)

Family: Aulorhynchidae--Tube-snouts

Aulorhynchus flavidus Gill (many-spined stickleback, tube-snout) (2049, p70), (2390, p355-6), (5500)

Dist: Alaska to southern California (San Nicholas Is.) (2049, p70)

Coll: Wash: Puget Sound region, Alki Pt., in Seattle, Meadowdale, Whidby Island, Hoods Canal, Pt. Ludlow, Pt. Townsend, San Juan Islands, Pt. Angeles (2049, p70), coastal, Cape Johnson, Grays Harbor (2049, p70), Ore: Coastal, Tillamook Bay, Cape Arago (2049, p70)

Hab: Marine (2049, p70)

Remarks: Common shore fish appearing in schools at the surface near wharves. Also around eelgrass. Eats small plankton crustaceans. (2390), Abundant, no commercial value (2049, p70).

Family: Syngnathidae--Pipefish and Seahorses

Syngnathus californiensis Storer (kelppipe fish) (2033, p321)

Dist: Central California (2033, p321)

Hab: Intertidal (2033, p321)

Syngnathus griseolineatus Ayres (Bay pipefish) (2049,p70),(2390,p356-7), (5500)

Dist: Southeastern Alaska to Monterey Bay (2049,p70)

Coll: Wash: Coastal, Puget Sound, Seattle, Hoods Canal near Holly, Pt. Ludlow, San Juan Islands (2049,p70), Grays Harbor (2049,p70), Ore: Coastal, Tillamook Bay, Nestucca Bay, Yaquina Bay, Siuslaw R., Fort Umpqua, Coos Bay, Cape Arago (2049,p70), Columbia River mouth

Hab: Marine

Misc: Common, no commercial value.

Remarks: Found in eelgrass and around wharves. Reproduces in spring. Eats small crustaceans. Young incubated in brood pouch of male (2390)

Order: Lampidriformes

Family: Lamprididae--Opah

Lampris reguis Bonnaterre - (Opah) (2390,p171-173)

Dist: Alaska to southern California (2390)

Remarks: Prefers warmer seas and open ocean; food consists of crustaceans, squid and small fishes; used for food in Europe and Japan (2390)

Family: Trachipteridae--Ribbonfishes

Trachipterus altivelis Kner (2341)

Dist: Oregon (2341)

Trachipterus rex-salmonorum Jordan and Gilbert - (King-of-the-Salmon, ribbon fish) (2049,p66),(2567,p49),(2390,p173-4)

Dist: Washington to southern California (2049,p66),(2567,p49),(2390)

Coll: B.C.: (2049,p66), Puget Sound: St. of Juan de Fuca at Sherringham Pt. (2049,p66)

Hab: Marine

Misc: Rare, no commercial value

Remarks: Stomach contents of one individual was 2 rockfish, 1 lantern fish, several squid and octopi and numerous small crustaceans. (2390)

Trachipterus trachypterus
see *T. rex-salmonorum*

Order: Perciformes
Family: Serranidae--Sea Basses

Roccus saxatilis (Walbaum) - (striped bass) (2049, p73), (2567), (5535), (5614), (5644), (5642)

Dist: Atlantic Coast of North America. Introduced to Pacific Coast; now taken from northern Oregon to southern California, uncommon north of Coos Bay and south of Monterey (2567, p71)

Coll: Ore: Coastal, Coos Bay (2049, p72)

Hab: Marine and freshwater., Anadromous (2567, p71)

Misc: Common, considerable commercial value (2049, p72). Life History: Fish spawn in flooding tide. Seem to spawn in rivers near the mouth in water of salinity of around 0. Spawn mainly in spring around June. Migrate into rivers in spring, back into sloughs in fall and out to the ocean in winter. Food: Voracious eaters. Eating mainly: viviparous perch, herring, sardlance, surf smelt, anchovies, sculpins, shrimp, and crabs. Eat many salmon. Fry eaten in spring. Tolerances: Adult bass has tolerated changes over range of 45° - 80°F in experiments to determine effect of abrupt transfer between salt and freshwater and vice-versa. Juveniles survived 55°-70°F but did not tolerate 45°F from fresh to salt water (5614). In migrations from San Francisco Bay to ocean, the run through Golden Gate does not develop if the ocean temp. is too cold (5642). Comm. value: Common, very important commercial and sport fish (2049, p72), (5535). Introduced to West in 1879 (5614).

Family: Coryphaenidae--Dolphins

Coryphaena hippurus Linnaeus - (Common dolphinfish) (2567, p81)

Dist: Common in warm seas (2567, p81)

Coll: Ore: Off Columbia River (2567, p81)

Misc: Little commercial value.

Family: Bramidae--Pomfrets

Brama raii (Bloch) (pomfret) (2049, p71), (2390, p221-22)
Brama rayi (Bloch) (5500)
Dist: Alaska to Santa Catalina Island (2049, p71)
Coll: Puget Sound: Pt. Townsend(2049, p71), Wash: Coastal, Cape Flattery (2049, p71), Ore: Coastal, Newport (2049, p71)
Misc: Not common, no commercial value. Very abundant off Queen Charlotte Island in 1956 when temperature of water was 57°F excellent food fish. Food: squid, fish, and crustaceans (2390)

Family: Sciaenidae--Drums

Cynoscion nobilis Ayres - (white seabass) (2567, p95), (3009, p19-33), (2390, p217-18)
Atroctoscion nobilis (Ayres) - (white seabass) (2049, p72) old name.
Dist: Alaska to Magdalena Bay, Baja Calif. Uncommon north of San Francisco. (2567, p95), (2390)
Coll: Str. Juan de Fuca (2049, p72)
Hab: Marine
Misc: Important commercially and as a sport fish. No commercial value northward. Prefer warmer parts of habitat. (3009). Spawn from March to August near kelp beds. Voracious and carnivorous, eat pilchards, herring, anchovies, smelt, crustaceans, squids, and other invertebrates. (2390, p218)

Genyonemus lineatus Ayres - (white croaker) (2567, p100), (2390, p218-19)
Dist: Vancouver Island to San Juanico Bay, Baja Calif. Rare north of San Francisco (2567, p100), (2390)
Hab: Schools with greenfish and other species in shallow water over sandy bottoms. Also in bays and sloughs. (2567, p100). Spawns from November to May. Eats worms, small crustaceans, and molluscs (2390)
Misc: Small commercial value.

Family: Embiotocidae--surf perches

Amphisticus rhodoterus Agassiz (red-tail perch) (3008,p44),(2567,p104) same as Holoconotus rhodoterus

Brachyistius frenatus Gill (viviparous perch) (kelp perch) (2049,p136), (3008,p87-89),(2567,p113),(2390,p214),(5526),(2419)

Dist: Vancouver Island to California (2049,p136),(3008,p89), (2567,p113)

Coll: Wash: Puget Sound region (2049,p136)

Hab: Marine (2049,p136), rocky coasts in the kelp, occur to 15 fms. Eat mainly crustaceans (2390)

Remarks: Common, slight commercial value (2049,p136),(3008,p87-9), (2567,p113). Rarely approaches intertidal area. Stays in kelp. Eaten by gulls mainly herbivorous (5526)

Cymatogaster aggregatus Gibbons (perch, shiner, viviparous perch) (2049,p136),(3008,p76),(2567,p112),(2390)

Coll: Wash: Puget Sound region, Seattle, Meadowdale, Pt. Ludlow, Possession Sound, Saratoga Passage, Hoods Canal near Holly, Pt. Townsend, Pt. Angeles, San Juan Island, "New Orcas Islands," (2049,p136), Golden Gardens (3008,p75), Coastal, Cape Flattery, Quillayute R. mouth, Quinault R. mouth, Grays Harbor, Ore: Cannon Beach, Tillamook Bay, Nestucca Bay, Yaquina Head, Yaquina Bay, Siuslaw R. mouth, Coos Bay near Empire (2049,p136)

Hab: Marine (2049,p136)

Remarks: Common, slight commercial value as bait (2049,p136)

Phys: Is more resistant to changes in oxygen content or carbon dioxide content of sea water than either Oncorhynchus kisutch or Clupea pallasii. This is in keeping with the fact that the alkali reserve of the blood plasma of Cytomagaster aggregata changes very rapidly with changes in carbon dioxide tension of sea-water (2575,p368)

Life cycle: Found in shallow waters in summer, deeper in winter. Breed from April to July. 8-36 young liberated after 10-12 months. Eats small crustaceans and other invertebrates (2390), Found in schools around piles (3804). For males, increasing or long photoperiod, such as late winter, spring or early summer, results in spermatogenesis, development of secondary sex structures, and reproductive behavior.

See also Chapter 20
p. 253

Cymatogaster aggregatus (continued)

Warm temperatures are related also and enhance this. Cold temperature and short photoperiod, as in winter, results in testicular restitution and growth of spermatogonia. (2484) For females, warm temperature as found in late summer and early autumn, aids oocyte formation. Cold temperature (early winter) aids oocyte maturation. Early gestation is aided by cold temperature, but needs warm temperature in late pregnancy. (2484), Age and Growth Studies (3384)

Damalichthys vacca Girard (pile perch, silver perch) (2049,p137), (3008,p56-59) obsolete name, (2390,p210-11)

see *Rhacachilus vacca*

Embiotoca lateralis L. Agassiz (striped perch)(3008,p62-64),(2390,p211-12), (blue perch) (2049,p137), (2567,p110),(5548),(2416)

Ditrema laterale obsolete name (2419)

Taeniotoca lateralis

Dist: Alaska to California (3008,p64),(2390),(2049,p137)

Coll: Wash: Puget Sound region, San Juan Islands, Golden Gardens, Ft. Steilacoom, Seattle, Meadowdale, Hoods Canal near Holly, Coastal, (2049,p137), Cape Johnson, Willapa Bay, Pacific Co. (3008,p64),(2567,p110), Ore: Coastal, Tillamook Bay, Cape Foulweather, Nestucca Bay, Yaquina Bay, Yaquina Head, Ecola Rocks, Coos Bay, Cape Arago (2049,p137)

Hab: Rocky areas and around wharf piling, small commercial value (3008,p64), Marine (2049,p137). Fish live in rocky banks pilings and eel grass

Misc: Common, considerable commercial value (2049,p137)

Remarks: Biol: Young born in June and July. Eat small crustaceans, worms, mussels, and sometimes herring eggs (2390) Give birth to young in late spring and early summer before July 1. Mainly ate amphipods of species *Ampithoe* and *Anisogammarus*. Amphipods appeared to constitute almost entirely the food of young of the year and one-year old fish. Mussels, barnacles, surface insects, isopods and shrimp found in adult stomachs also. Shrimp were *Upogelia* sp. and *Callianassa* sp. (5548) Tagging seemed to indicate homing instinct (not conclusive)

Embiotoca lateralis (continued)

Temp: Temperature seems to be a limiting factor in determining the range of embiotocids. In Yaquina Bay, fish were found in areas of salinity >26‰ and temperature <16°C, mainly around 32‰ and 13°C. 19°C seemed too high.

Holconotus rhodoterus Agassiz (porgy) (2049, pl37), (3008, p44-46), (redtail perch), (2567, pl04), (2390, p208-9), (2419)

Amphisticus rhodoterus (Aggassiz) (2567, pl04), (3008, p44), (5500, p33)

Dist: B.C. to California (2049, pl37), (3008, p44-46), (2567, pl04)

Coll: Wash: Puget Sound region, Ft. Steilacoom, Str. Juan de Fuca, Coastal, Cape Flattery, James Is. at La Push, Quinault R. mouth, Shoalwater (Willapa) Bay; Ore: Col R. mouth, Astoria, coastal, Cannon Beach, mouth of Yaquina Bay (2049, pl37), (3008, p46)

Hab: Marine (2049, pl37)

Remarks: Common, slight commercial value (2049, pl37), (3008, p46), (2567, pl04)

Hyperprosopon argenteum Gibbons (white perch, wall-eyed surf fish) (2049, pl37), (3008), (2567, pl03), (2390, p207-8)

Dist: B.C. to California (2049, pl37), (3008, p34), (2567, pl03), (2390)

Coll: Ore: Coastal, Yaquina Bay, Coos Bay, Astoria (2049, pl37)

Hab: Marine (2049, pl37), Surf off sandy beaches (3008, p34)

Remarks: Common, slight commercial value (2049, pl37). Observed to mate in November in Calif. Gestation period of 5-6 months. Liberate 5-12 young. In S. Calif., were observed to mate in November in water 4-12 ft. deep about 25-200 ft. offshore over rocky areas with sand patches. Found usually in schools of 4-10 females and 1 male. Mating takes place in pairs only. Birth of young in April (2390). Growth and Development (3384)

Hyperprosopon ellipticum (Gibbons) (silver perch) (3008, p34-36), (2567, pl03), (5520)

Dist: B.C. to California (3008, p36), (5520)

Coll: B.C.: Schooner Cove (5520), Wash: Clallam Co. (3008, p36)

Hab: Surf along sandy beaches (3008, p36)Taken over a sandy bottom between 8 and 10 feet below intertidal zone in dense eel grass (5520)

Remarks: No commercial value (2567, pl03)

Micrometrus aurora (Jordan and Gilbert) (reef perch) (2033,p320), (3008,p84-6)
Dist: California (2033,p320)
Hab: Intertidal (2033,p320)

Phanerodon furcatus Girard (white seaperch, white surffish, forktail perch, splittail perch) (2049,pl37),(3008,p51-53), (2567,pl06),(2390,p209-10)
Dist: Vancouver Island to California (2049,pl37)
Coll: Wash: Puget Sound region, San Juan Islands, coastal, Grays Harbor, Ore: Yaquina Bay, Coos Bay (2049,pl37)
Hab: Marine (2049,pl37)
Remarks: Common, slight commercial value (2049,pl37), most important commercial species of surf perch in Calif. (3008,p53),(2567,pl06),(2390)
Growth and Development: (3384)

Rhacochilus vacca Girard (2567,pl04),(3008,p56)
see also *Damalichthys vacca*
Dist: Alaska to California (2049,pl27),(3008,p59)
Coll: Wash: Puget Sound region, Ft. Steilacoom, Seattle, Hoods Canal near Holly, Saratoga Passage, Pt. Angeles, San Juan Islands, Golden Gardens, Seattle, (3008,p58), Coastal, Vancouver Isl., Grays Harbor (2049,pl37), Ore: Coastal, Tillamook Bay, Nestucca Bay, Yaquina Bay, Coos Bay, Cape Arago (2049,pl37)
Hab: Marine (2049,pl37), rocky and sandy shores, near wharf pilings, sometimes taken in purse seine catches of sardines (3008,p59). Found in shallow waters in summer, deeper waters in winter. Good sport fish (2390)
Remarks: Common, considerable commercial value (2049,pl37)

Taeniotoca lateralis (Agassiz (blue perch) (2049,pl37) (obsolete nomenclature)
see *Embiotoca lateralis*

Tocichthys ellipticus (Gibbons) (silver perch, silver porgy) (2049,pl36)
Dist: Washington to California (2049,pl36)
Coll: Wash: Puget Sound Region, Seattle, Pt. Angeles, (2049,pl36), Coastal, Cape Johnson, Clallom Co., Pt. Grenville near Moclips, Grays Harbor (2049,pl37), Ore: Columbia River mouth (2049,pl37), Coastal, Cannon Beach, Cape Foulweather, Yaquina Bay, Ecola Rocks (2049,pl37)
Remarks: Common, slight commercial value (2049,pl36)

CHORDATA - FISHES - Scombridae

Family: Scombridae--Mackerels and Tunas

Euthynnus pelamis Linnaeus - (skipjack) (5500)
Katsuwonus pelamis Linnaeus (2567, p86), (2390, p227-28)
Dist: Vancouver Isl. to South America. Rare north of Pt. Conception.
Remarks: Great commercial value (2567, p86), (2390), Eats small fish and plankton crustaceans. Excellent game fish. Occurs in larger schools. (2390)

Germo alalunga (Gmelin) (2049, p70)
see Thunnus alalunga.

Pneumatophorus diego Ayres (2049, p70), (2567, p84) obsolete name
see Scomber japonicus

Pneumatophorus japonicus (Houttwyn) (2390, p228) obsolete name.
see Scomber japonicus

Sarda chilensis (Cuvier and Valenciennes) - (skipjack, California bonito) (2049, p70)
Sarda lineolata Girard (2567, p85), (2390, p226-7)
Dist: Vancouver Island to Chile. Common southward. (2049, p70), (2567, p85), (2390)
Coll: Wash: Puget Sound region, Vancouver Isl, (2567, p85), Str. of Juna de Fuca off Sherringham Pt. (2049, p70)
Hab: Marine.
Remarks: Slight commercial value, Good sport fish and excellent food fish. Eats squid and various fishes. (2390)

Scomber japonicus Houttwyn - (Pacific mackerel) (5500)
Pneumatophorus japonicus Houttwyn (2390, p228)
Pneumatophorus diego (Ayres) (2049, p70), (2567, p84)
Dist: Alaska to California (2567, p84), (2049, p70), (2390)
Coll: B.C.: Nanaimo (2390), Wash: Puget Sound, Str. Juan de Fuca, off Sherringham Pt. on Vancouver Is.; Ore: Coastal, Coos Bay (2049, p70), (2390)
Hab: Marine
Misc: Small commercial value. No fishery in Washington
Remarks: Spawns off California coast from late April through July near shore; eggs are pelagic and hatch in 3 days; eats crustaceans, squids and small fishes (2390)

CHORDATA - FISHES - Scombridae

Thunnus alalunga (Bonaterre) - (albacore) (2341),(2571,p37),(2390,p224-25),
(5516),(2640),(5650)
Thunnus germo (Lacepede)
Germo alalunga (Gmelin) (2049, p70)
Dist: Gulf of Alaska to Mexico (2049,p71),(2571,p37)
Coll: 52°49'N, 134°29'W, Wash: Puget Sound region, coastal,
Ore: Coastal, Coos Bay (2049, p71)
Misc: Very great commercial value (2571,p37),(2049,p71)
Remarks: Fished from mid-July to late October. (2571,p37) Pelagic. Extensive feeding migrations. Eat schooling fish such as anchovies, pilchard, herrings, sauries, young mackeral, and albacore, blue lantern fish (Tarletonbeania crenularis) and squid and zooplankton (2390), generally offshore. (5516) Water zones under 16.3°C and over 22.8°C seem to be barriers to migrations. Large tuna prefer the higher temps while the smaller tuna prefer lower temps. (5655) Evidence points to one albacore population in North Pacific. Migrates from American coast to Asian coast. Fished by Japan in spring and U.S. in summer. Spawn in subtropical waters. Stays there one year. (5650)

Thunnus germo (Lacepede)
see Thunnus alalunga

Thunnus thynnus (Linnaeus) - (blue fin tuna, tuna) (2049,p71)
Thunnus saliens Jordan and Evermann - (California bluefin tuna) (2567,p88),
(2390,p225-6)
Dist: Gulf of Alaska to Guadalupe Isl. (2049,p71)
Coll: Ore: Coastal, Columbia R. (2567,p88),(2049,p71)
49°N, 134°24'W--48°50'N, 131°06'W--51°N, 130°W (2390)
Misc: Slight to good commercial value (2049,p71),(2567;p88),
(2390,p225-6)
Hab: Marine (2049,p71)
Remarks: Food consists of anchovies, mackerel, squid, is eaten by killer whale (2390)

Trachyrus symmetricus Ayres (horse mackerel, Spanish mackerel,
Pacific Jack mackerel) (2567,p83),(2390,p222-23),(5619)
Dist: B.C. to Acapulco, Mexico (2567,p83)
Coll: B.C.: Nootka, Massett Inlet, Monesby Island (2390)

Trachyrus symmetricus (continued)
Misc: Very important commercial value (2567,p83)
Remarks: Spawning from Feb. to Oct. from Washington to Baja Calif. Temp determines incubation time. (5619) 108.5 hrs. at 14°C and 84 hrs. at 15°C. Spawning area bounded approximately by 26th parallel in south, 45th in north and 150th meridian on west. Temp. may have importance on when or where they spawn. Greatest abundance of eggs found at 10 meter depths. Also length of day may have something to do with spawning. About 60% of spawning took place within 1° of 15.5°C. Although this temp. remains fairly constant in waters off Calif., spawning occurs only in summer and spring. Maybe length of day also is important. For 1952-1954, survival at end of 30 days was shown to be 131, 112, 179 larvae/100,000 eggs hatched. Variation insignificant (5619)

See also Chapter 20 p. 301

Family: Gobiidae--Gobies

Clevelandia ios (Jordan and Gilbert) - (Arrow goby) (2049,p138),(2033,p321), (2390, 360-61),(5500)
Dist: Vancouver Island to Calif. (2049,p138)
Coll: Wash: Puget Sound region, Hoods Canal, San Juan Islands, Coastal, Cape Elizabeth near Taholah, Grays Harbor,
Ore: Coastal, Tillamook Bay, Coos Bay (2049,p138)
Misc: Common
Hab: Marine, Intertidal (2033,p321), Found over mixtures of sand and mud. Can bury themselves in sand very quickly (2390)

Coryphopterus nicholsii (Bean) (2033,p321),(2390,p358-9),(5500)
see Rhinogobiops nicholsii (Bean) (2049,p137)

Gillichthys mirabilis Cooper - (Mudsucker, long-jawed goby) (2567,p143), (2049,p138)
Dist: Puget Sound to Mexico (2049,p138)
Coll: Puget Sound region (2049,p138)
Hab: Marine
Misc: Not rare, slight commercial value (2049,p138), (2567,p143)

CHORDATA - FISHES - Gobiidae

Lepidogobius lepidus (Girard) (Bay goby, Finescale goby) (2049,pl37), (2390,p359-60), (5500)
Dist: Vancouver Island, to Calif. (2049,pl27)
Coll: Wash: Puget Sound region: Hoods Canal near Holly. Useless Bay, Whidbey Is., San Juan Islands (2049,pl38)
Hab: Marine
Misc: Not rare
Remarks: Found on muddy bottoms from shallow water to 30 fms (2390)

Lethops connectens Hubbs (Halfblind goby) (2033,p321)
Dist: Central Calif. (2033,p321)
Hab: Intertidal (2033,p321)

Quietulay-cauda (Jenkins and Evermann) (2049,pl38),(5519)
Dist: Vancouver Island to Guaymas, Sonora (2049,pl38)
Coll: Wash: Puget Sound region, Vancouver Isl. (2049,pl38)
Hab: Marine
Misc: Not rare
Remarks: In Gulf of California, where max. summer temp. is around 37°C, this fish has maximum critical temp. of 37.4 ±.1°C in March and 42.3 ± .03°C in September (5519)

Rhinogobiops nicholsii (Bean) (2049,pl37) (Blue spot, crested goby)
Coryphopterus nicholsii (Bean) (2033,p321), (2390,p358-9),(5500)
Dist: B.C. to southern California (2049,pl37)
Coll: Wash: Puget Sound region, Hoods Canal near Holly (2049,pl37)
Hab: Intertidal, (2033,p321), marine
Misc: Not rare

Family: Scorpaenidae--Scorpionfishes and rockfishes

Sebastodes aleutianus Jordan and Evermann - (Rougheye rockfish, blackthrough rockfish) (5500),(2390,p261-62)
Dist: Gulf of Alaska to California (2390)
Coll: 50°N, 126°W at 52 fms (2390)

Sebastolobus alascanus Bean (Shortspine channel rockfish, spiny-headed rockfish, lobe-finned rockfish) (2049,p73),(2341),(2567, pl36),(2390,p280-1)

Sebastolobus alascanus (continued)
Dist: Bering Sea to Santa Barbara Islands (2049,p73),(2567,p136)
Coll: Wash: Puget Sound region, Str. Juan de Fuca, Coastal, Albatross Station 3343, Albatross Station 2866; Ore: Coastal, Albatross Station 3346, (2049,p73), 50°49'N, 127°36'W at 238 fms (2390)
Hab: Marine, water from 100 to 300 fms (2567,p136)
Misc: Not common. No commercial value, good sport fish (2390)

Sebastodes alutus (Gilbert) - (Pacific ocean perch, long-jawed rockfish) (5500), (2049,p74),(2390,p262-3)
Dist: Bering Sea to Calif (2049,p74),(2390)
Coll: Wash: Puget Sound region, Str. Juan de Fuca, Coastal, Albatross Stations 3449,3459 (2049,p74), 48°29'N, 124°40'W at 135 fms (2390)

See also Chapter 20 p. 294

Hab: Marine
Misc: No commercial value (2049,p74),(2390)
Parasites: (3235),(3409)
Remarks: Occurs between 38-350 fms. Is important food of halibut and albacore (2390), see also Vol. I, Chap 20

Sebastodes auriculatus (Girard) (brown rockfish) (2049,p75),(2390,p273-4), (2417)
Sebastichthys auriculatus (Obsolete) (2417)
Dist: Puget Sound to California (2049,p75),(2390)
Coll: Wash: Puget Sound region, Columbia River mouth; Ore: Coastal (2049,p75)
Hab: Marine
Misc: No commercial value

Sebastodes caurinus (Richardson),(Copper rockfish) (yellow-backed rockfish) (2049,p75),(2390,p275-6),(2417)
Sebastichthys caurinus vexillaris (Obsolete) (2417)
Dist: Sitka, Alaska to Yaquina Bay, Oregon (2049,p75),(2390)
Coll: Wash: Puget Sound region, Seattle, off Everett, Hoods Canal near Holly, Pt. Ludlow, San Juan Islands, Str. Juan de Fuca, Albatross Station 3449; Ore: Coastal, Yaquina Bay (2049,p75)
Hab: Marine
Misc: Common. Commercial value (2049,p75),(2390)
Remarks: Moderate depth.

Sebastodes chrysomelas (Jordan and Gilbert) (2033,p320),(2567,p133),(2417)
Sebastichthys chrysomelas (Obsolete) (2417)
Dist: No. Calif. to Baja Calif. (2567,p133),(2033,p320)
Coll: Central Calif coast (2033,p320),(2567,p133)
Hab: Intertidal (2033,p320)

Sebastodes columbianus Hubbs and Schultz (2049,p73)
Dist: Columbia River mouth (2049,p73)

Sebastodes crameri Jordan (black-blotched rockfish) (2390), (black mouth rockfish (5500),(2049,p74),(2390,p258-9)
Coll: Ore: Coastal (2049,p74),(2390)
Ore: off Tillamook (2049,p74)
Hab: Marine
Misc: Rare, no commercial value

Sebastodes diploproa (Gilbert) (lobe-jawed rockfish, splitnose rockfish) (2390,p266-7),(2049,p74)
Dist: Nanaimo, B. C. to Coronado Islands (2049,p74)
Coll: Puget Sound region: Hoods Canal (2049,p74),49°11'N, 123°54'W at 54 fms (2390)
Hab: Marine
Remarks: Found mainly in deep water, 50-369 fms (2390). Spawns in spring (3411)
Misc: Not common, no commercial value

Sebastodes elongatus (Ayres) (Green-striped rockfish), (2049,p75),(2567,p132),(2390,p272-3),(2417)
Sebastichthys elongatus (obsolete) (2417)
Dist: Puget Sound to Lower California (2049,p75),(2567,p132)
Coll: Wash: Puget Sound region, Hoods Canal, Saratoga Passage, Coastal; Ore: (2049,p75)
Hab: Marine, in deep waters (2390)
Misc: Not common, no commercial value
Remarks: Spawns in spring (3411)

Sebastodes emphaeus Starks (2049,p74)
Coll: Puget Sound (2049,p74)
Wash: Puget Sound region, Elliott Bay, Saratoga Passage, San Juan Islands, O'Neal Island, San Juan Co. (2049,p74)
Hab: Marine
Misc: Not common, no commercial value

Sebastodes entomelas (Jordan and Gilbert) (Widow rockfish) (2341)(2567, pl28)
Sebastichthys entomelas (2417) (obsolete)
Dist: Oregon to Calif. (2341) (2567, pl28)
Misc: Little commercial value (2567, pl28)

Sebastodes flavidus Ayres (Yellowtail rockfish) (2049, p73), (2567, pl23), (2390, p253-54), (2417)
Dist: Washington to Lower California (2049, p73), (2567, pl23), (2390)
Coll: Wash: Puget Sound region, coastal, northward to Cape Flattery; Ore: Yaquina Bay, Heceta Bank, offshore from Cape Arago, Cape Blanco and Port Orford (2049, p73)
Hab: Marine
Misc: Common, slight commercial value

Sebastodes introniger (Gilbert) - (Alaska red rockfish) (2049, p74)
Dist: Bering Sea to Calif. (2049, p74)
Coll: Puget Sound region: off Everett (2049, p74)
Hab: Marine
Misc: No commercial value

Sebastodes maliger (Jordan and Gilbert) (speckled or brown rockfish, orange-spotted rockfish, quillback rockfish) (2390), (2049, p75)
Sebastichthys maliger (2417), Obsolete
Dist: Alaska to Calif. (2390)
Coll: Wash: Puget Sound region: Seattle, Elliott Bay, Possession Sound, Hoods Canal, Saratoga Passage, San Juan Islands, Str. Juan de Fuca; Ore: Coastal, Port Orford (2049, p75)
Hab: Marine
Misc: Common, commercial value (2049, p85), good sport fish
Remarks: Rather deep water (2417)

Sebastodes melanops (Girard) (black bass) (2049, p73), (2033, p320), (2567, pl24), (2390, p254-5), (2417)
Sebastichthys melanops obsolete (2417)
Dist: Alaska to California (2049, p73), (2567, pl24)
Coll: Wash: Puget Sound region, Seattle, San Juan Islands, Str. Juan de Fuca, coastal, Neah Bay, Cape Flattery, Cape Johnson, La Push, Pt. Grenville near Moclips, Cape Elizabeth near Taholah; Ore: Columbia R. mouth, Astoria, Coastal, Ecola Rocks, Cape Falcon, Three Arch Rocks, near Oceanside, Nestucca Bay, Otter Rock to Cape Foulweather, Yaquina Head, Yaquina Bay, Cape Arago, Pt. Orford, off Siuslaw R. mouth (2049, p73)

Sebastodes melanops (continued)
Parasites: (3233)
Hab: Marine, intertidal (2033,p320), common along rocky shores (2390)
Misc: Common, considerable commercial value

Sebastodes miniatus (Jordan and Gilbert) - (vermilion rockfish) (2049,p74), (2417),(2390,p257-8),(2567,pl 27)
Sebastichthys miniatus (2417) Obsolete
Dist: Vancouver Is. to Baja Calif. (2567,pl 27),(2049,p74)
Coll: Ore: Coastal, Port Orford Reef (2049,p74)
Remarks and Misc: Lives in moderate depths (2417), Slight commercial value

Sebastodes mystinus (Jordan and Gilbert) (black bass, blue rockfish) (2390),(5500),(2049,p73),(2033,p320),(2567,pl 25),(2417)
Dist: Alaska to San Diego (2049,p73),(2567,pl 25)
Coll: Wash: Puget Sound region, Seattle and Str. Juan de Fuca; Ore: coastal, off Coos Bay, Pt. Orford (2049,p73)
Hab: Marine, intertidal (2033,p320), shallow water (2567,pl 25), occurs between 40-50 fms. Breeding occurs in November to January (2390)
Misc: Common, slight commercial value

Sebastodes nebulosus (Ayres) (yellowstripe rockfish, China rockfish, Chinese rockcod, yellow spotted rockfish) (2049,p76), (2567,pl 34),(2390,p277-8),(2417),(5500)
Sebastichthys nebulosus Obsolete (2417)
Dist: Hecate Strait to Pt. Conception (2049,p75)
Coll: Wash: Puget Sound region, Seattle, Coastal, Neah Bay; Ore: Coastal (2049,p76) 50°43'N, 127°19'W at 69 fms (2390)
Hab: Marine, moderate depth water in kelp or around rocky shores (2567,pl 34)
Misc: Not common, no commercial value (2049,p75),(2567,pl 34)

Sebastodes nigrocinctus (Ayres) (tiger rockfish, black-banded rockfish) (5500),(2049,p76),(2390,p279-80)
Sebastichthys nigrocinctus Obsolete (2417)
Dist: Alaska to Monterey Bay (2049,p76),(2390)
Coll: Wash: Puget Sound region, San Juan Islands, Str. Juan de Fuca, Neah Bay (2049,p76)
Hab: Found in deeper waters
Remarks: More abundant around Str. Juan de Fuca than in southern part of range. Breeding habits same as for rest of family.
Misc: Common, commercial value

CHORDATA - FISHES - Scorpaenidae

Sebastodes paucispinis (Ayres) (bocaccio, grouper) (2049,p73),(2033,p320) (2417),(2567,pl21)
Sebastichthys paucispinis Obsolete (2417)
Dist: Barkley Sound, B.C. to San Diego (2049,p73),(2567,pl21)
Coll: Wash: Barkley Sound; Ore: Off Newport and on Heceta Bank, Yaquina Bay (2049,p73)
Hab: Marine. Intertidal (2033,p320), Occurs below 40 fms. Eats small fish. Good sport fish (2390)
Misc: Common southward, some commercial value

Sebastodes pinniger (Gill) (orange rockfish, canary rockfish) (2049,p73) (5500),(2567,pl26),(2390,p256-7),(2417)
Sebasthichthys pinniger Obsolete (2417)
Dist: Hecate Str. to Lower California (2049,p74),(2567,pl26)
Coll: Wash: Puget Sound region, Hoods Canal near Holly, Admirality Inlet, Coastal, Neah Bay, Flattery Bank, Grays Harbor, Shoalwater Bay; Ore: Coastal, Cape Falcon, Cape Lookout, Yaquina Head, Hecata Bank off mouth Siuslaw R., off Tahkenitch Cr., off mouth Umpqua R., off mouth Coquille R., Port Orford Reef, off Cascade Head, Yaquina Bay (2049,p74)
Parasites: (3233)
Hab: Marine
Misc: Common, slight commercial value
Remarks: Young found in shore waters and adults in deeper waters. Some larger individuals found up to 100 fms (2390)

Sebastodes proriger (Jordan and Gilbert) (red-striped rockfish) (2049,p74), (2390,p260-1),(2417)
Sebastichthys proriger Obsolete (2417)
Dist: Puget Sound to Calif. (2049,p74),(2390)
Coll: Wash: Puget Sound region, Elliott Bay, Saratoga Passage (2049,p74)
Hab: Marine
Misc: No commercial value

Sebastodes rosaceus (Girard) (rosy rockfish) (2049,p74),(2567,pl29), (2390,p267-8),(2417)
Sebastichthys rosaceus Obsolete (2417)
Dist: Puget Sound to Lower California (2049,p74)
Coll: Wash: Puget Sound region, coastal, Cape Flattery; Ore: (2049,p74)
Remarks: Common in California to 70 fms (2390)
Hab: Marine
Misc: Common, slight commercial value

Sebastodes ruberrimus Cramer (red rockfish, red rockcod, red snapper, rasphead rockfish) (2390,p268-9), (5500), (2049,p75), (2567, pl26), (2417)
  Sebastichthys ruber - Obsolete (2417)
    Dist: Southeastern Alaska to San Diego (2049,p75), (2567,pl26), (2390)
    Coll: Wash: Puget Sound region, Seattle, Str. of Juan de Fuca, Hoods Canal near Holly, Coastal, Neah Bay, Cape Flattery, Cape Johnson, Willapa Bank, Bank off Grays Harbor, Shoalwater Bay, (Willapa); Ore: Coastal, off Tillamook Head, off Cape Mears, off Yaquina Head, off Cape Perpetua, off Heceta Bank, off mouth of Siuslaw R., and Port Orford Reef, Pt. Orford (2049,p75)
    Hab: Marine, common along coast from 30-150 fms (2390), more abundant in northern part of range.
    Misc: Common, considerable commercial value (2049,p75)

Sebastodes rubrivinctus (Jordan and Gilbert) (Spanish flag, flag rockfish) (2049,p75), (2567,pl27), (2390,p270-1), (5514), (2417)
  Sebastichthys rubrivinctus - Obsolete (2417)
    Dist: B. C. to Calif. (2049,p75) (2390)
    Coll: No records for Washington and Oregon (2049,p75)
    Hab: Marine, apparently deep water species, occurring below 100 fms (5514)
    Remarks and Misc: No commercial value; spawns in spring (3411)

Sebastodes rupestris (Gilbert) (2049,p74)
    Dist: Southeastern Alaska to Lower Calif. (2049,p74)
    Coll: No records from Washington or Oregon (2049,p74)
    Hab: Marine
    Misc: No commercial value

Sebastodes saxicola (Gilbert) (stripetail rockfish, olive-backed rockfish) (2390,p264-6), (2049,p74)
    Dist: Southeastern Alaska to San Diego, Calif. (2049,p74) (2390)
    Coll: B. C.: Barkley Sound, Nootka Sound, Portier Pass (2390); Ore: Coastal (2049,p74)
    Hab: Marine
    Misc: No commercial value
    Remarks: In depths from 25-391 fms (2390)

Sebastodes wilsoni Gilbert (Pygmy rockfish) (2390, p263-4), (2049, p74)
Dist: Swiftsure Shoal, B. C. to Calif (2049, p74)
Coll: B. C.: Swiftsure Shoal at 23 fms, Esteban Pt., and Sydney Inlet at 61 and 30 fms (2390)
Hab: Marine
Misc: No commercial value
Remarks: Offshore species (2390)

Sebastodes zacentrus (Gilbert) (sharpchin rockfish) (2390, p271-2), (2049, p75), (5500)
Dist: Puget Sound to San Diego, California (2049, p75), (2390)
Coll: Wash: Puget Sound region, San Juan Islands; Ore: Coastal, Coos Bay (2049, p75)
Hab: Marine
Misc: No commercial value

Sebastolobus altivelis Gilbert (spiny-headed rockfish, lobe-finned rockfish) (2049, p73), (2341)
Dist: Aleutian Islands to San Diego, California (2049, p73)
Coll: Wash: Coastal, Albatross Station 2871, 559 fms (2049, p73); Ore: (2341)
Hab: Marine, in deep water
Misc: Not common, no commercial value

Family: Anoplopomatidae--Sablefishes

Anoplopoma fimbria (Pallas) (skil fish, coalfish, black cod, sablefish, mackerel) (2049, p76), (2341). (2567, p138), (2571, p46-48), (2390, p239-40), (5648)
Dist: Alaska to southern California (2049, p76)
Coll: Wash: Coastal, Saratoga Passage, Puget Sound--off docks, Seattle, San Juan Islands, Str. Juan de Fuca (2049, p76), Cape Flattery, Flattery Bank to Grays Harbor, Cape Johnson, near Destruction Is., in 859 fms, Willapa Bank, off Shoalwater (2049, p76); Ore: Coastal, off Nestucca Bay, off Cascade Head, off Cape Perpetua, off Siuslaw R., Heceta Bank and Port Orford Reef (2049, p76); Calif: Cape Colnett (2567, p138), (2571, p46-8)
Hab: Marine. Deep water in the winter, moving into shallower water in spring and summer as season progresses (2567, p138)

Anoplopoma fimbria (continued)
Misc: Food: Eats crustaceans, worms and small fishes (2390)
Life cycle: Spawns in early spring. Eggs are pelagic (2390). Spawns between 200-400 fms later moves to 100-175 fms (5648). Adults demersal. Found mainly over clay or hard mud bottom. Annual fluctuations of catch due to demand rather than population changes. Tagging reveals separate, non-intermingling populations on Pacific Coast. There has been a decline in population off Ore. and Wash. none in Calif. (5648)

Erilepis zonifer (Lockington) - (giant sea bass, priest-fish, skil fish) (2049,p76),(2390,p241-2)
Dist: Alaska to Monterey, Calif. (2049,p76)
Coll: Queen Charlotte Islands (2390), Puget Sound region (2049,p76)
Hab: Marine
Misc: Not common, no commercial value

Family: Hexagrammidae - Greenlings

Chiropsis decagrammus (Pallas) (2049,p76)
see *Hexagrammos decagrammus* (rock trout) (2049,p76)

Hexagrammos decagrammus (Pallas) (2033,p320), (kelp greenling, greenling sea trout) (2341),(2418),(2390,p242-3),(2567,p142)
Chiropsis decagrammus (Pallas) (2049,p76)
Dist: Kodiak Is. to Southern California. Rare in south, common in B.C. (2390)
Coll: B.C.: Nootka Sound, Wash: Puget Sound region, Seattle, San Juan Islands, Sucia Is., Pt. Angeles, Coastal, Neah Bay, Cape Johnson, La Push, Cape Elizabeth near Taholah, Pt. Grenville near Moclips; Ore: Columbia R. mouth, Astoria, Coastal, Cape Falcon, Three Arch Rocks near Oceanside, Cape Foulweather, Yaquina Head, Yaquina Bay, Ecola Rks, Cape Arago (2049,p76),(2341)
Hab: Marine (2049,p76), Intertidal (2033,p320), Found along rocky shores; reefs, and around kelp beds. Small specimens found in surface plankton in high seas of Gulf of Alaska.
Biol: Spawn in October and November. Eats worms, crustaceans and small fishes. Eaten by steelhead and salmon (2390)
Misc: Desirable sport fish (2567,p142),(2049,p76),(2033,p320), Common slight commercial value (2049,p76)

CHORDATA - FISHES - Hexagrammida

Hexagrammos stelleri Tilesius (2049, p77), (2390, p244-45), (2418)
Dist: Kamchatka to San Francisco (2049, p77), (2390)
Coll: Wash: Puget Sound region, Seattle, Hoods Canal near Holly, Pt. Ludlow, Pt. Angeles, San Juan Islands, Sucia Island; Ore: Columbia River, Coastal (2049, p77)
Hab: Marine, along rocky shores but also in shallow water over sandy beaches
Remarks: Eats worms and crustaceans and small fishes (2390)
Misc: Common, slight commercial value

Hexagrammos superciliosus (Pallas) (Rock greenling) (2390, p245-6), (2033, p320)
Lebius superciliosus (Pallas) (Red greenling) (2049, p77), Obsolete
Dist: Berring Sea to southern Calif (2390) (2049, p77)
Coll: B.C.: Rose Harbor, Departure Bay, Port Simpson and west Vancouver Island (2390); Wash: Puget Sound region, Pt. Townsend, San Juan Islands, New Orcas Islands, Coastal, Cape Flattery, Cape Johnson, La Push, Cape Elizabeth near Taholah, Pt. Grenville near Moclips; Ore: Coastal, Ecola Rks, Cape Falcon, Three Arch Rks, near Oceanside, Cape Foulweather, Yaquina Head, Cape Arago (2049, p77)
Hab: Intertidal (2033, p320), Marine
Misc: Common, slight commercial value (2049, p77)

Lebius superciliosus (Pallas) - (Red greenling) (2049, p77)
see Hexagrammos superciliosus (Pallas)

Ophiodon elongatus Girard - (ling cod, cultus cod) (2049, p77), (2567, p139), (2418), (5647), (2390, p248-9), (3804, p97-98)
Dist: Alaska to Baja Calif. (2567, p139), (2049, p77)
Coll: Wash: Puget Sound region, Seattle and Str. Juan de Fuca, Pt. Ludlow, San Juan Islands, Pt. Angeles, Coastal, Neah Bay, Cape Flattery, Cape Johnson, La Push, Columbia River mouth, Chinook; Ore: Coastal, off Cape Meares, Heceta Bank, off mouth Coquille R., and Port Orford Reef, Coos Bay, Cape Arago (2049, p77)
Remarks: Hab: Marine, near bottom of intertidal zone to 60 fms. Rests on bottom. Biol: Spawns from late December to February or March. Deposits eggs in sheltered rocky location. Eggs hatch in about 6 weeks, protected by male. Eats herring, flounders, hake, cod, whiting, sand lances, young ling cod, some crustaceans and squid. Young eat shrimp, adults eat almost anything alive. (2390), (5647)
Misc: Common, considerable commercial value, see also Vol. I, Chap. 20

See also Chapter 20
p. 283

Oxylebius pictus Gill (convict fish, painted greenling) (2049,p77),
(2390,p246-7),(2033,p320),(2416)
Dist: B.C. and Puget Sound to Lower Calif. (2416),(2049,p77),(2390)
Coll: Wash: Puget Sound region, Vancouver Isl., Seattle, Hoods
Canal near Holly, San Juan Islands, Str. Juan de Fuca;
Ore: Coastal, Tillamook Bay (2049,p77),(2416)
Hab: Marine, Intertidal (2033,p320)
Misc: Common, no commercial value
Remarks: Lives along rocky shores among sea weed (2390)
Used for bait (2416)

Family: Zaniolepidae--Combfishes

Zaniolepis latipinnis Girard (long-spined greenling, broad-finned greenling,
long spine combfish) (2049,p77),(2390,p247-8),(5500),
(2416)
Dist: North Pacific southward to San Diego, California (2049,p77)
Coll: Wash: Puget Sound region, Ft. Steilacoom, Seattle (2049,p77)
Hab: Marine
Remarks: Found at moderate depths to 62 fms. Feeds partly on
crustaceans. (2390)
Misc: Common, no commercial value (2049,p77)

Family: Cottidae--Sculpins

Artedius corallinus (Hubbs) - (Coralline sculpin) (2033,p321),(5500)
Dist: Central Calif. (2033,p321)
Hab: Intertidal (2033,p321)

Artedius creaseri (Hubbs) - (roughcheek sculpin) (2033,p320),(5500)
Dist: Central Calif. (2033,p320)
Hab: Intertidal (2033,p320)

Artedius fenestralis (Jordan and Gilbert, 1882) -(padded sculpin) (2049,p78)
(2033,p321),(2390,p298-9),(5500)
Astrolytes fenestralis (Jordan and Gilbert, 1882)
Dist: Unalaska to San Francisco Bay (2049,p78)
Coll: Wash: Puget Sound, Seattle, Meadowdale, Hoods Canal near
Holly, Pt. Ludlow, Admiralty Head, Whidby Isl., San
Juan Islands, Pt. Angeles (2049,p78), Coastal, La Push,

Artedius fenestralis (continued)
Cape Elizabeth near Taholah, Pt. Grenville near Moclips (2049,p78); Ore: Coastal, Ecola Rocks, Cape Falcon, Three Arch Rks. near Oceanside (2049,p78), Calif: Central (2033,p321)
Hab: Marine
Misc: Common nothward, rare southward, no commercial value
Remarks: Inhabits water to 30 fms. Spawning occurs from January to March. Food--shrimp and small fish

Artedius harringtoni Starks - (scalyhead sculpin) (2033,p320),(2390,p296-7), (5500)
Dist: B.C. to southern Calif. (2390)
Hab: Intertidal (2033,p320), occurs at moderate depths (2390)

Artedius lateralis (Girard) - (smoothhead sculpin) (2049,p127),(2390,p299-300), (5500)
Dist: B.C. to Pt. Conception (2049,p127)
Coll: Wash: Puget Sound, Seattle, Hoods Canal near Holly, San Juan Islands (2049,p127), Coastal, Neah Bay and Cape Flattery, Cape Johnson, La Push, Cape Elizabeth near Taholah, Pt. Grenville, near Moclips, (2049,p127); Ore: Coastal, Ecola Rocks, Cape Falcon, Cape Foulweather, Yaquina Head, Cape Arago (2049,p127)
Hab: Marine, found in tidepools and shallow water.
Misc: Common, no commercial value
Remarks: Spawn in February. Lay eggs in protected areas of rock. Hatch in 16 days (2390)

Ascelichthys rhodorus Jordan and Gilbert - (Rosylip sculpin) (2049,p132), (2390,p310-11),(5500)
Dist: Alaska (Sitka) to Fort Bragg, California (2049,p132),(2390)
Coll: Wash: Puget Sound, Deception Pass, Friday Harbor, San Juan Islands (2049,p132), Coastal, Neah Bay, Cape Flattery, Cape Johnson, La Push, Reef opposite Quillayute Needles, Cape Elizabeth near Taholah (2049,p132); Ore: Coastal, Cape Foulweather, Yaquina Head, Ecola Rocks, Cape Arago (2049,p132)
Hab: Marine, common in tide pools
Misc: No commercial value
Remarks: Tidepool fish. Found under rocks at low tide (2390)

CHORDATA - FISHES - Cottidae

Aspicottus bison Girard
See Enophrys bison (Girard)

Axyrias harringtoni Starks - (sculpin) (2049, p78)
Dist: Puget Sound to Monterey Bay, California (2049, p78)
Coll: Wash: Puget Sound, Seattle, Hoods Canal near Holly, Pt. Ludlow, San Juan Islands (2049, p78), Cape Johnson, La Push (2049, p78); Ore: Coastal, Ecola Rocks, Cape Falcon, Cape Foulweather, Yaquina Head, Cape Arago (2049, p78)
Hab: Marine
Misc: Common, no commercial value

Blennicotus globiceps (Girard) (2039, p304)
see Clinocottus globiceps (Girard)

Blepsias cirrhosus (Pallas) - (silver spotted sculpin, silver spot) (2049, p128), (2390, p315-16), (5500)
Dist: Alaska to San Francisco (2049, p128)
Coll: Wash: Puget Sound, Seattle, Pt. Ludlow, San Juan Islands, New Orcas Islands, Pt. Angeles, Str. of Juan de Fuca (2049, p128), Cape Johnson; Ore: Coastal, Cape Arago (2049, p128)
Hab: Marine
Misc: Common, no commercial value (2049, p128)
Remarks: Spawns in summer. A shallow water fish, usually found around eelgrass (2390)

Chitonotus pugetensis (Steindachner) - (rough-backed sculpin) (2049, p78), (2390, p286-7)
Dist: Puget Sound to San Diego, California (2049, p78), (2390)
Coll: Wash: Puget Sound, Ft. Steilacoom, Pt. Townsend, Elliott Bay, Seattle, Pt. Ludlow, Possession Sound, Saratoga Passage, San Juan Islands, Str. Juan de Fuca (2049, p78)
Hab: Marine
Misc: Common, no commercial value
Remarks: Common in waters of moderate depths, not much beyond 40 fms. Eats shrimp and other crustaceans (2390)

CHORDATA - FISHES - Cottidae

Clinocottus acuticeps Gilbert (Sharpnose sculpin) (2390,p306-7),(5500),
Oxycottus acuticeps (Gilbert) (2049,p131)
Dist: Aleutian Islands south to Sausalito, Marin Co., Calif. (2049, p131),(2390,p306)
Coll: Wash: Puget Sound, Seattle, Meadowdale, Hoods Canal near Holly, mouth Sikiu R., Clallam Co., San Juan Islands (2049,p131), Coastal, Cape Flattery, Cape Johnson, La Push, Reef opposite Quillayute Needles, Cape Elizabeth near Taholah, Pt. Grenville near Moclips (2049,p131); Ore: Coastal, Cape Falcon, Three Arch Rks. near Oceanside, Cape Foulweather, Yaquina Head, Yaquina Bay, Ecola Rocks, Cape Arago (2049,p131)
Remarks: Found along coast in tidepools and on sandy beaches (2390)

Clinocottus analis (Girard) (Wooly sculpin) (2033,p321),(5500),(2878)
Dist: Central Calif. to Baja Calif. (2033,p321),(2878)
Hab: Intertidal (2033,p321)
Remarks: Only sculpin to invade subtropical waters (2878)

Clinocottus embryum (Jordan and Starks) (2033,p321), (2390,p305-6),(5500)
Allocottus embryum (Jordan and Starks) (2049,p131)
Dist: Aleutian Islands to Point Lobos, Calif., rare southward. (2049, p131),(2390)
Coll: Wash: Puget Sound--rocks north of Manchester, Pt. Ludlow, Friday Harbor, San Juan Islands (2049,p131), Coastal, Neah Bay, Cape Johnson, Cape Elizabeth near Taholah (2049,p131); Ore: Coastal, Three Arch Rks. at Oceanside; Yaquina Head, Ecola Rocks, Cape Arago (2049,p131); Calif: Central (2033,p321)
Hab: Marine, intertidal (2033,p321), not uncommon in rocky littoral areas (2390)
Misc: Not common, no commercial value

Clinocottus globiceps (Girard) (mosshead sculpin, round-headed sculpin) (2049,p132),(2039,p304),(2033,p321),(2687),(5500),(2390, p304-5),(2878)
Blennicotus globiceps (Girard) (2039,p304)
Dist: Alaska to southern Calif. (2390),(2049,p132)
Coll: Wash: Puget Sound, San Juan Islands, Str. of Juan de Fuca, (2049,p132), Coastal, Neah Bay, Cape Flattery, Cape Johnson, La Push, Reef opposite Quillayute Needles, Cape Elizabeth near Taholah, Pt. Grenville near Moclips (2049,p 132); Ore: Coastal, Cape Foulweather, Yaquina Bay,

Clinocottus globiceps (continued)
Yaquina Head, Ecola Rocks, Cape Arago (2049,pl32); Calif: Central (2033,p321)

Hab: Intertidal to mid-intertidal (2033,p321),(2878), common in rocky tidepools (2049,pl32)

Remarks: Found to be tolerant of salinities up to 75‰ at 12°C and a drop in salinity tolerance at 15°C. Decreased salinity tolerance continued to 26°C - maximum survival temp. for C. globiceps. Salinity tolerance at 26°C was 44‰. Q_{10} = 3.6 (2878)

Misc: Marine, no commercial value (2049,pl32)

Clinocottus recalvus (Greeley) - (Bald sculpin) (2033,p321),(5500),(2878)

Dist: Central Calif. to Baja Calif. (2878),(2033,p321)

Hab: Intertidal (2033,p321), found from 38°N south to Baja Calif. in mid-intertidal zone (2878)

Remarks: Q_{10} of 2.9 (2878)

Dasycottus setiger Bean (Spinyhead sculpin, wooly sculpin) (2049,pl32), (2390,p311-12), (5500)

Dist: Bering Sea to Puget Sound (2049,pl32), (2390)

Coll: Wash: Puget Sound, off Tulalip, San Juan Islands (2049,pl32), 49°11'N, 123°54'W at 54 fms (2390)

Hab: Marine

Misc: Not rare, no commercial value

Dialarchus snyderi Greeley - (Cirrated sculpin) (2049,pl31)
See Oligocottus snyderi

Enophrys bison (Girard) - (buffalo sculpin) (2390,p308-9), (5500)
Aspicottus bison Girard - (buffalo sculpin) (2049,pl28)

Dist: Alaska to Point Conception, Calif. (2049,pl28)

Coll: Wash: Puget Sound, Seattle, Meadowdale, Hoods Canal near Holly, Pt. Ludlow, Admiralty Head, Port Townsend, San Juan Islands, Pt. Angeles (2049,pl28), Cape Elizabeth near Taholah, Pt. Grenville near Moclips, Grays Harbor (2049,pl28); Ore: Cape Falcon, Three Arch Rks. near Oceanside, Cape Foulweather, Yaquina Head, Yaquina Bay, Coos Bay, Cape Arago (2049,pl28)

Hab: Marine, found in shallow water

Remarks: Food: Eats shrimps, crabs, amphipods, mussels and small fishes such as herring, young salmon, seaperches, and sandlances and also sea lettuce Ulva ; Spawns

Enophrys bison (continued)
in February and March; (some value as a sport fish for youngsters) (2390)
Misc: Abundant, no commercial value

Gilbertidea sigalutes (Jordan and Starks) - (soft sculpin) (2049,pl32), (2390,p313-14),(5500)
Dist: Puget Sound
Coll: Puget Sound: off Everett, Hoods Canal, San Juan Islands. (2049,pl32)
Hab: Marine
Misc: Common, no commercial value (2049,pl32)

Hemilepidotus hemilipidotus (Tilesius) - (Red Irish Lord) (2049,pl27), (2033,p320),(2390,p284-5)
Dist: Alaska to Monterey Bay, Calif. (2049,pl27)
Coll: Wash: Puget Sound, Seattle, San Juan Islands, Pt. Angeles (2049,pl2), Neah Bay, Cape Johnson, La Push, Cape Elizabeth near Taholah, Pt. Grenville near Moclips; (2049,pl2); Ore: Coastal, Ecola Rocks, Cape Falcon, Three Arch Rocks near Oceanside, Cape Foulweather, Yaquina Head, Coos Bay, Cape Arago (2049,pl2)
Hab: Marine, Intertidal
Remarks: Spawns in March, sometimes laying eggs above low tide marks. Food: Eats crabs, barnacles and mussels (2390)
Misc: Common, no commercial value

Hemilepidotus spinosus (Ayres) - (Brown Irish Lord) (2033,p320), (5500),(2341),(2390,p283-4)
Calycilepidotus spinosus (obsolete name) - (2049,pl28)
Dist: British Columbia to California (2390)
Coll: Wash: Coastal, Cape Johnson (2049,pl28); Ore: Coastal, Columbia River mouth, Ecola Rocks, Cape Falcon, Cape Foulweather, Yaquina Head, Cape Arago (2049,pl28), (2341)
Hab: Marine (2049,pl28), intertidal (2033,p320)
Remarks: Caught in rather deep waters. Feeds on crustaceans (2390). Common, no commercial value (2049,pl28)

Icelinus borealis Gilbert - (sculpin, comb-sculpin) (2390), (northern sculpin) (5500),(2049,p78),(2390,p287-8)
Dist: Alaska to Washington (2049,p78),(2390)
Coll: Wash: Coastal, Seattle Admiralty Inlet, Albatross Stations 3597, 4205, 4209, 4212, 4213, 4217, and 4218, Hoods Canal near Holly, San Juan Islands, Str. Juan de Fuca, (2049,p78), 48°25'N, 124°10'W at 53 fms.
Remarks: Found in depths 10-60 fms. Eats mainly shrimp (2390). Common, no commercial value (2049,p78),(2390)

Icelinus burchami Evermann and Goldsborough - (sculpin) (2049,p78)
Dist: Alaska to California (2049,p78)
Coll: Wash: Hoods Canal near Holly (2049,p78)
Hab: Marine (2049,p78)
Remarks: Rare. No commercial value (2049,p78)

Icelinus filamentosus Gilbert - (threadfin sculpin) (5500), (filamented sculpin) (2390,p390-91)
Dist: British Columbia to California (2390)
Coll: 49°20'N, 123°43'W at 23 fms (2390)
Remarks: Food consists of crustaceans including shrimp and isopods (2390)

Icelinus tenuis Gilbert - (spotfin sculpin) (5500) (lesser filamented sculpin) (2390,p289-90)
Dist: Queen Charlotte Islands to California (2390)
Coll: 49°20'N, 123°43'W at 23 fms (2390)
Hab: Found in depths of 20-70 fms in B. C.; found from 18-204 fms in Calif.
Remarks: Eats some shrimp (2390)

Jordania zonope Starks - (sculpin) (2049,p77),(longfin sculpin) (2390,p285-6), (5500),(2033,p320),
Dist: Washington to California (2049,p77)
Coll: Wash: Pt. Orchard, San Juan Islands (2049,p77)
Hab: Intertidal (2033,p320)
Remarks: Not common, no commercial value (2049,p77)

Leptocottus armatus Girard - (staghorn sculpin) (2033,p321),(2567,p140), (2687),(2390,p309-10),(5500),(2878)
Dist: Alaska to Baja California (2567,p140)
Coll: 60°N to 30°30'N (2687); Calif: Central coastal (2033,p321)

Leptocottus armatus (continued)

Hab: Intertidal (2033, p321), close to shores and in bays, enters brackish and fresh water at stream mouths (2567, p140). Found over mud flats (2878). Dredged 5-15 fms off central Oregon (3412)

Remarks: Life Cycle: Spawns in February. Food: Eats a variety of invertebrates. Eaten by water fowl, especially ducks (2390). Temp. & Sal.: Found to be able to stand salinities up to 67.5‰ at 12°C. Tolerance failed gradually up to 25°C, than a rapid drop in salinity tolerance to 37.5‰. Could stand full strength sea water up to 29.5°C (2687). No commercial value (2687), food and feeding in Humboldt Bay (3374)

Leptocottus armatus armatus Girard - (bullhead) (2049, p130)

Dist: Kodiak Island to Carmel River, California (2049, p131)

Coll: Wash: Puget Sound region, Seattle, Meadowdale, Pt. Ludlow, Hood's Canal near Holly, Saratoga Passage, Pt. Angeles, Sikiu R. mouth, Clallam Co., San Juan Islands, Orcas Island, Cape Flattery, Quillayute R. mouth, Quinault R. mouth, Grays Harbor, Shoalwater Bay (Willapa), Columbia River mouth; Ore: Cannon Beach, Tillamook Bay, Three Arch Rks. near Oceanside, Nestucca Bay, Yaquina Head, Yaquina Bay, Siuslaw R. mouth, Coos Bay. (2049, p131)

Hab: Marine

Misc: Common, no commercial value

Malacocottus kincaidi Gilbert and Thompson - (Black fin sculpin) (2049, p130), (2390, p312-13), (5500)

Dist: Burrard Inlet to Puget Sound (2049, p130), (2390)

Coll: Puget Sound: Hoods Canal (2049, p130); 49°19'N, 123°47'W at 157 fms (2390)

Hab: Marine

Misc: Not rare, no commercial value

Myoxocephalus polyacanthocephalus (Pallas) - (great sculpin) (2049, p130), (2390, p307-8), (5500)

Dist: Bering Sea to Puget Sound (2049, p130), (2390)

Coll: Wash: Puget Sound, Seattle, Meadowdale, Marrowstone Pt., Admiralty Head, Pt. Angeles, San Juan Islands, Str. Juan de Fuca (2049, p130), Coastal, Cape Flattery (2049, p130)

Myoxocephalus polyacanthocephalus (continued)
Hab: Marine. Common along coasts in moderate depths. Eats partly small fishes such as sculpins and blennies (2390)
Misc: Common, no commercial value

Nautichthys oculofasciatus (Girard) - (sailor fish, sailfin sculpin) (2049,pl28),(2390,p318-19),(5500)
Dist: Alaska to Monterey, (2049,pl28),(2390)
Coll: Puget Sound: Ft. Steilacoom, Seattle, Hoods Canal near Holly, Pt. Ludlow, Saratoga Passage, Admiralty Inlet, Oak Bay, Pt. Townsend, San Juan Islands, Str. Juan de Fuca (2049,pl28)
Hab: Marine
Remarks: Found in shore waters and to depths of 60 fms. Eats some crustaceans (2390)
Misc: Common, no commercial value

Oligocottus maculosus Girard - (tidepool sculpin, tide pool Johnny) (2049,pl31),(2033),(2878),(2687),(2390),(5500)
Dist: Okhotsk Sea and southern Alaska south to near Tunitas, San Mateo Co., California (2049,pl31) 60°N - 37°30'N (2687)
Coll: Wash: Puget Sound, Fort Steilacoom, Fox Inlet, Seattle, Meadowdale, Hoods Canal near Holly, Pt. Angeles, Friday Harbor, San Juan Islands, Mouth of Siskiu R., Clallam Co., Neah Bay, Cape Flattery, Cape Johnson, La Push, Pt. Grenville near Moclips; Ore: Coastal, Cape Falcon, Three Arch Rks. near Oceanside, Cape Foulweather, Yaquina Head, Yaquina Bay, Ecola Rocks, Coos Bay, Cape Arago (2049,pl31)
Hab: Marine, intertidal (2033,p321), high intertidal (2878). Very abundant in shallow waters, especially tide pools (2390).
Misc: Common, no commercial value. Tolerant of 75‰ salinity at 12°C, salinity tolerance dropped rapidly at 15°C. Species can survive at 26.5°C when salinity dropped to 21.5‰ (2687) $Q_{10} = 2.1$ (2878).

Oligocottus rimensis (Greeley) - (saddle back sculpin) (2033,p321),(2390, p300-301),(5500)
Dist: Vancouver Island to northern and central Calif. (2390), (2033,p321)
Hab: Intertidal (2033,p321), found in tidepools (2390)

CHORDATA - FISHES - Cottidae

Oligocottus rubellio (Greeley) (2033, p321)
Dist: Central Calif. (2033, p321)
Hab: Intertidal (2033, p321)

Oligocottus snyderi Greeley - (Fluffly sculpin) (2033, p321), (2390, p302-3), (5500), (2878)
Dialarchus snyderi Greeley - (cirrated sculpin) (2049, p131)
Dist: Queen Charlotte Islands, Ucluelet, B. C., to Point Loma, San Diego Co., California (2049, p131), (2390)
Coll: Wash: Cape Johnson, La Push, Reef on shore opposite Quillayute Needles, Cape Elizabeth near Taholah, Pt. Grenville near Moclips (2049, p131); Ore: Cape Falcon, Three Arch Rks. near Oceanside, Cape Foulweather, Yaquina Head, Ecola Rocks, Cape Arago (2049, p131); Calif: Central (2033, p321)
Hab: Marine, intertidal (2033, p321), tidepools (2390)
Misc: Common, no commercial value

Orthonopias triacis Starks and Mann (snub nose sculpin) (2033, p321)
Dist: Central California (2033, p321)
Hab: Intertidal (2033, p321)

Parastrolytes notospilotus (Girard) - (sculpin) (2049, p78)
Dist: Straits of Juan de Fuca southward to southern California (2049, p78)
Coll: Wash: Puget Sound region, Pt. Townsend (2049, p78)
Hab: Marine
Misc: Rare northward. No commercial value

Paricelinus hopliticus Eigenmann and Eigenmann - (sculpin) (2049, p78)
Dist: Off Oregon to Cortez Banks (2049, p78)

Prionistius macellus Bean
see *Triglops macellus*

Psychrolutes paradoxus Gunther - (tadpole sculpin) (2049, p132), (2390, p314-15), (5500)
Dist: Kodiak Island to Puget Sound. (2049, p132)
Coll: Wash: Puget Sound region, Pt. Ludlow, Pt. Townsend, Pt. Angeles and Str. Juan de Fuca, Friday Harbor, San Juan Islands, 48°25'N, 125°10'W at 53 fms (2049, p132)
Hab: Marine, in water of moderate depths to 120 fms (2390)
Misc: Common, no commercial value

Radulinus asprellus Gilbert (slim sculpin) (2390),(5500),(2049,pl27), (2390,p291-2)
Dist: Burrard Inlet B. C. to Farallon Islands, California (2049,pl27)
Coll: Wash: Coastal, Puget Sound region, Seattle, Admiralty Inlet, Hoods Canal, Port Susan, Saratoga Passage, San Juan Islands; Ore: Coastal (2049,pl27)
Hab: Marine
Misc: No commercial value

Radulinus boleoides Gilbert (2049,pl27)
Dist: Puget Sound to Santa Catalina Island (2049,pl27)
Coll: Puget Sound: San Juan Islands
Hab: Marine
Misc: No commercial value

Rhamphocottus richardsoni Gunther - (northern sea horse, gruntfish, grunt sculpin) (2049,pl32),(2390,p319-20),(5500)
Dist: Sitka, Alaska, Puget Sound to Monterey, Calif. (2049,pl32)
Coll: Puget Sound region, Pt. Ludlow, Admiralty Inlet, Hoods Canal, San Juan Islands, Str. Juan de Fuca (2049,pl32)
Hab: Marine. Found in tidepools and shallow waters, but has also been taken on sandy beaches and up to 90 fms.
Remarks: Eats some small crustaceans (2390)
Misc: Common in Puget Sound. No commercial value

Ruscarius meanyi Jordan and Starks - (Puget Sound sculpin) (2049,pl27)
Dist: Puget Sound (2049,pl27)
Coll: Wash: Puget Sound: Port Orchard (2049,pl27)
Hab: Marine
Misc: Common, no commercial value

Rusciculus rimensis Greeley (2049,pl31)
Dist: B.C. to Monterey Co., Calif. (2049,pl31)
Coll: Wash: Puget Sound, Admiralty Head, San Juan Islands (2049, pl31), Coastal, Cape Johnson (2049,pl31); Ore: Coastal, Cape Arago (2049,pl31)
Hab: Marine
Misc: Not common, no commercial value

Scorpaenichthys marmoratus (Ayres) - (blue cod, marbled sculpin, bull cod, cabezon) (2049,pl28),(2033,p320),(2341),(2567,pl41), (2390,p282-3)
Dist: Washington to San Diego (2049,pl28),(2567,pl41)

Scorpaenichthys marmoratus (continued)

Coll: Wash: Puget Sound region, Seattle, Meadowdale, Hoods Canal near Holly, San Juan Islands, Coastal, Cape Johnson, La Push, Cape Elizabeth near Taholah, Pt. Grenville near Moclips, Grays Harbor; Ore: Coastal, Columbia River mouth, Astoria, Ecola Rocks, Cape Falcon, Tillamook Bay, Three Arch Rks. near Oceanside, Cape Foulweather, Yaquina Head, Yaquina Bay, Cape Arago (2049, p128)

Hab: Marine, intertidal (2033, p320). Shallow inshore water over a hard bottom depth 30-40 fms. Found on rocky, muddy and sandy bottoms and in kelp beds.

Food: Adults eat mainly crabs (2567, p141), eats crustaceans, mainly crabs and shrimps, also fishes and fish eggs. (2390)

Misc: Spawning in January to March. Common, slight commercial value

Synchiris gilli Bean (Manacled sculpin) (2049, p132), (2033, p321), (2390, p322-3), (5500), (2408)

Dist: Vancouver Island and Puget Sound (2049, p132)

Coll: Wash: Puget Sound region, Pt. Townsend, Friday Harbor, False Bay, San Juan Islands (2049, p132)

Hab: Marine, intertidal (2033, p321), Found in shallow waters of tidepools and bays and also around wharf piles and rocks (2390)

Misc: Rare, no commercial value

Tarandichthys filamentosus (Gilbert) - (long-rayed sculpin) (2049, p78)

Dist: Alaska to Santa Barbara Islands (2049, p78)

Coll: Wash: Puget Sound region, off Everett, Saratoga Passage, Hoods Canal near Holly. (2049, p78)

Hab: Marine

Misc: Not rare, no commercial value

Tarandichthys tenuis (Gilbert) (2049, p78)

Dist: Alaska to southern California (2049, p78)

Coll: Wash: Puget Sound region, Possession Sound, Hoods Canal near Holly, Saratoga Passage (2049, p78)

Triglops beani Gilbert

see Triglops pingeli (Reinhardt)

Triglops macellus Bean - (roughspine sculpin) (2390,p294),(5500)
Prionistius macellus Bean (2049,pl 27),(2390,p294)
Dist: Bering Sea to Wash. (2390),(2049,pl 27)
Coll: B. C.: (2049,pl 27), Wash: Puget Sound, Possession Sound, Saratoga Passage, San Juan Isl., Lopez Isl. (2049,pl 27)
Hab: Marine
Misc: No commercial value (2049,pl 27)

Triglops pingeli Reinhardt - (ribbed sculpin) (5500)
Triglops beani Gilbert (2049,pl 27)
Dist: Alaska to Puget Sound (2049,pl 27)
Coll: Wash: Puget Sound region: Admiralty Inlet, Whatcom Co., San Juan Isl., Str. Jran de Fuca (2049,pl 27)
Hab: Marine
Misc: Common, no commercial value

Zesticelus profundorum (Gilbert) (2049,pl 32)
Dist: Bering Sea, Alaska and in great depth off California. This species has not been recorded from Washington and Oregon. (2049,pl 32)
Hab: Marine
Misc: No commercial value

Family: Agonidae--Poachers and alligatorfish

Agonopsis emmelane (Jordan and Starks) - (windowtail poacher, northern spearnose poacher) (2341),(2390,p326-7),(5500)
Averruncus emmelane Jordan and Starks (window-tail sea poacher) (2049,pl 33)
Dist: Southeastern Alaska to California (2390),(2049,pl 33)
Coll: Wash: Puget Sound region, Seattle, off Everett, Pt. Ludlow, Hoods Canal, Whatcom Co., San Juan Islands, Str. Juan de Fuca (2049,pl 33); Ore: (2341)
Hab: Marine:
Misc: Common, no commercial value
Remarks: Often taken in shrimp trawls from muddy bottoms (2390)

Agonus acipenserinus Tilesius (sturgeon poacher) (2390,p336-7),(5500)
Podothecus acipenserinus (Tilesius) - (common alligatorfish, sturgeon sea poacher) (2049,pl 33)
Dist: Alaska to Puget Sound (2049,pl 33)

Agonus acipenserinus (continued)
Coll: Wash: Puget Sound region, Ft. Steilacoom and Pt. Townsend, Simeahmoo, Seattle, Saratoga Passage, Pt. Ludlow, Whatcom Co. , Pt. Angeles, San Juan Islands, New Orcades, Gulf of Georgia, Str. Juan de Fuca, Cape Flattery (2049,pl33)
Hab: Marine
Misc: Common, no commercial value
Remarks: Eats some crustaceans and marine worms (2390)

Anoplagonus inermis (Gunther) - (smooth alligator fish, smooth sea poacher) (2049,pl34),(2390,p335),(5500)
Dist: Alaska to Columbia River (2049,pl34),(2390)
Coll: Wash: Puget Sound region, Pt. Ludlow, Hoods Canal, Whatcom Co. , San Juan Islands, Str. Juan de Fuca, Columbia River (2049,pl34)
Hab: Marine
Misc: Common, no commercial value (2049,pl34)

Asterotheca alascana (Gilbert) - (gray star-snout) (2049,pl34),(2390,p329-30), (5500)
Dist: Alaska to Puget Sound (2049,pl34),(2390)
Coll: Puget Sound region: San Juan Islands, Str. Juan de Fuca (2049,pl34), 48°16'N,123°45'W at 100 fms (2390)
Hab: Marine
Misc: No commercial value

Asterotheca infraspinata (Gilbert) - (spinycheek starsnout, sea poacher) (2049,pl34),(2390,p330-1),(5500)
Dist: Bering Sea to Washington (2049,pl34),(2390)
Coll: Wash: Puget Sound region, San Juan Islands, Coastal, Cape Flattery (2049,pl34)
Hab: Marine, taken at depths of 10-30 fms (2390)
Misc: No commercial value

Asterotheca pentacantha (Gilbert) - (sea poacher, big eye starsnout) (2049,pl33),(2390,p331-2),(5500)
Dist: Bering Sea to San Diego (2049,pl33),(2390)
Coll: Wash: Puget Sound region, Admiralty Inlet, Str. Juan de Fuca, Coastal at 178 fms; Ore: Coastal (2049,pl33)
Hab: Marine
Misc: No commercial value (2049,pl33),(2390)

CHORDATA -FISHES - Agonidae

Bathyagonus nigripinnis Gilbert - (black sea poacher, blackfin poacher) (2049,p133),(2390,p327-8),(5500)

Dist: Aleutian Islands to Coast of Washington (2049,p133),(2390)
Coll: Wash: Puget Sound region, Hoods Canal near Holly, Saratoga Passage, Gedney Isl. Whidby Isl., off Tulalip, San Juan Islands, Coastal (2049,p133)
Hab: Marine
Misc: Common, no commercial value

Bothragonus swanii (Steindachner) - (Rockhead, Deep-pitted poacher, sea poacher) (2049,p134),(2390,p334-5),(5500)

Dist: Vancouver Island, Puget Sound, Washington (2049,p134),(2390)
Coll: Wash: Puget Sound region, Pt. Townsend, San Juan Islands, Coastal, Cape Johnson (2049,p134)
Hab: Marine
Misc: Rare, no commercial value

Hypsagonus quadricornis (Cuvier and Valenciennes) - (four-horned sea poacher) (2049,p133),(2390,p323-4),(5500)

Dist: Bering Sea to Puget Sound (2049,p133)
Coll: Wash: Puget Sound region, Admiralty Inlet, San Juan Islands, Friday Harbor, Str. Juan de Fuca (2049,p133), 48°21'N, 123°14'W at 48 fms (2390)
Hab: Marine, found in shallow water and tidepools at depths to 70 fms (2390)
Misc: Common, no commercial value

Occa verrucosa (Lockington) - (warty poacher, sea poacher) (2049,p133), (2390,p324-5),(5500)

Dist: Vancouver Island to California (2390)
Coll: Ore: (2049,p133); Calif: Central
Hab: Found in water from 11 to 36 fms (2390); Marine (2049,p133)
Misc: No commercial value (2049,p133)

Odontopyxis trispinosus Lockington - (sea poacher, pygmy poacher) (2049,p134),(2390,p333),(5500)

Dist: Alaska to Pt. Loma, California (2049,p134),(2390)
Coll: Wash: Puget Sound region, Pt. Ludlow, San Juan Islands (2049,p134)
Hab: Marine, inhabits sandy or rocky bottoms (2390)
Remarks: No commercial value (2049,p134),(2390)

Pallasina barbata Steindacher - (tubesnout poacher) (5500)
Pallasina barbata aix Starks (2049, pl33)
Dist: Aleutian Islands, Puget Sound to coast of Oregon (2049, pl33)
Coll: Wash: Puget Sound region, Pt. Angeles, San Juan Islands, Coastal, Cape Johnson; Ore: Coastal (2049, pl33)
Hab: Marine
Misc: No commercial value, common

Podothecus acipenserinus Tilesius (common alligatorfish) (2049, pl33)
see Agonus acipenserinus

Stellerina xyosterna (Jordan and Gilbert) (sea poacher) (2049, pl33)
Dist: Coast of Oregon and California (2049, pl33)
Coll: Oregon record has not been verified (2049, pl33)
Hab: Marine
Misc: No commercial value

Xeneretmus triacanthus (Gilbert) (sea poacher) (2049, pl33)
Dist: Washington to San Diego (2049, pl33)
Coll: Wash: Puget Sound region, Hoods Canal near Holly, Possession Sound, San Juan Islands, Coastal; Ore: Coastal, Columbia River (2049, pl33)
Hab: Marine
Misc: No commercial value

Xeneretmus latifrons Gilbert - (blacktip poacher) (2390, p328-9), (5500)
Xenopyxis latifrons (Gilbert) (2049, pl34)
Dist: Burrard Inlet, B. C. to San Diego, California (2049, pl34), (2390)
Coll: Wash: Puget Sound region, Elliott Bay, Seattle, Hoods Canal near Holly, Possession Sound, Saratoga Passage, San Juan Islands; Ore: Columbia River, Coastal, off Ore at 77 fms (2049, pl34), 49°20'N, 123°43'W at 23 fms (2390)
Hab: Marine
Misc: No commercial value

Family: Cyclopteridae--lumpfish and snailfish

Careproctus cypselurus (Jordan and Gilbert) (rock sucker) (2049, pl36)
Dist: Bering Sea to Washington (2049, pl36)
Coll: Coast of Washington (2049, pl36)

CHORDATA - FISHES - Cyclopteridae

Careproctus melanurus Gilbert (blacktail snailfish) (2390),(rock sucker) (2049,p135),(2341),(2390,p350)
Dist: B.C. to Calif. (2049,p135)
Coll: Wash: Albatross station 3076, 178 fms(2049,p135)
51°23'N, 130°34'W at 876 fms (2390)
Remarks: Not rare (2049,p135)

Eumicrotremus vinolentus (Jordan and Starks) (smooth lumpsucker) (2049,p134)
Dist: Washington (2049,p134)
Coll: Wash: Puget Sound region near Seattle (2049,p134)
Remarks: Rare, no commercial value (2049,p134),(Parr 1929: 29, states that this species is the young of some species of Eumicrotremus) (2049,p134)

Eumicrotremus orbis (Gunther) (spiny lumpfish, Pacific spiny lumpsucker) (2049,p134),(2390,p337-8),(5500)
Dist: Aleutian Islands to Washington (2049,p134),(2390)
Coll: Wash: Hoods Canal and Albatross Station 4205 in Puget Sound, San Juan Islands, Str. Juan de Fuca (2049,p134)
Hab: Some attached to rocks at low tides. Found up to 80 fms (2390)

Liparis fucensis Gilbert - (rock sucker, slipskin snailfish) (2049,p135), (2390,p344),(5500)
Dist: Alaska to California (2049,p135)
Coll: Wash: Pt. Ludlow, Admiralty Inlet, Hoods Canal, Saratoga Passage, Pt. Angeles, Str. Juan de Fuca, San Juan Isl., Cape Johnson, La Push, Reef off Quillayute Needles;
Ore: Cape Falcon, Cape Foulweather, Yaquina Head, Ecola Rocks, Cape Arago (2049,p135)
Remarks: Common (2049,p135), ranges from shallow water to 212 fms. Eats, in part, crustaceans (2390)

Liparis florae (Jordan and Starks) (tide pool snailfish, rock sucker) (2049, p135),(2033,p321),(5500),(2390,p340-1)
Dist: Washington to California (2049,p135),(2390)
Coll: Wash: Deception Pass, San Juan Islands, Waadda Island, Str. Juan de Fuca, Cape Johnson, La Push, Cape Elizabeth near Taholah, Pt. Grenville near Moclips;
Ore: Cape Falcon, Ecola Rocks (2049,p135)
Hab: Intertidal (2033,p321)
Remarks: Common (2049,p135)

Liparis dennyi Jordan and Starks - (marbled snailfish, rock sucker) (2049,pl35),(2390,p345),(5500)
Dist: Alaska to Washington (2049,pl35)
Coll: Wash: Pt. Ludlow, Possession Sound, Anacortes, San Juan Islands (2049,pl35), 48°16'N,123°45'W at 100 fms (2390)
Remarks: Common (2049,pl35),eats, in part, crustaceans(2390)

Liparis cyclopus Gunther - (Ribbon snailfish, rock sucker) (2049,pl35), (2390,p343),(5500)
Dist: Alaska to Washington (2049,pl35),(2390)
Coll: Wash: San Juan Islands, Str. Juan de Fuca (2049,pl35)
Remarks: Common in Puget Sound (2049,pl35),(2390)

Liparis callyodon (Pallas) - (spotted snailfish, rock sucker) (2049,pl35), (2390,p342-3),(5500)
Dist: Aleutian Islands to Washington (2049,pl35),(2390)
Coll: Wash: Deception Pass, Pt. Angeles, San Juan Islands, Albatross stations 4205 to 4207, Neah Bay, Cape Johnson (2049,pl35)
Remarks: Common in Puget Sound (2049,pl35), shore species found often in tidepools (2390)

Liparis mucosus Ayres (slimy snailfish, rock sucker) (2049,pl35),(5521)
Dist: B.C. to California (2049,pl35)
Coll: B.C.: Agate Beach, Little Beach, Vancouver Island (5521); Wash: Cape Johnson
Remarks: Rare (2049,pl35), taken over rocky bottoms within first 12 ft. below intertidal zone. Red algae and kelp present (5521)

Liparis pulchellus Ayres (showy snailfish, shorttail snailfish, rock sucker) (2049,pl35),(2390,p346),(5500)
Dist: Alaska to California (2049,pl35),(2390)
Coll: Wash: Pt. Ludlow, Possession Sound, Anacortes, San Juan Islands (2049,pl35)

Liparis rutteri (Gilbert and Snyder) (ringtail snailfish, rock sucker) (2049,pl35),(2390,p341-2),(5500)
Dist: Alaska to California (2390),(2049,pl35)
Coll: Wash: Cape Johnson, La Push, Cape Elizabeth near Taholah, Pt. Grenville near Moclips; Ore: Cape Falcon, Three Arch Rocks near Oceanside, Yaquina Head, Ecola Rocks, Cape Arago (2049,pl35)
Remarks: Not rare (2049,pl35),moderate depths (2390)

CHORDATA - FISHES - Cyclopteridae

Nectoliparis pelagicus Gilbert and Burke - (tadpole snailfish) (2049,pl35), (2341),(2390,p352-3),(5500)
Dist: North Pacific from Japan to California (2049,pl35)
Coll: 49°06'N, 123°21'W at 120 fms (2390)
Remarks: Rare (2049,pl35)

Paraliparis deani Burke (prickly snailfish, rock sucker) (2049,pl36), (2390,p350-1),(5500)
Dist: Alaska to California (2049,pl36)
Coll: 49°19'N, 123°43'W at 111 fms (2390), 54°N,130°W (2390)
Remarks: Not rare (2049,pl36)

Paraliparis ulochir Gilbert (rock sucker) (2049,pl36)
Dist: Bering Sea to Gulf of California (2049,pl36)

Polypera beringianus (Gilbert and Burke) (bering snailfish, rock sucker) (2049,pl34)
Dist: Alaska to Puget Sound (2049,pl35)
Coll: Wash: Pt. Townsend (2049,pl35)

Polypera greeni (Jordan and Starks) (Lobefin snailfish, rock sucker) (2049,pl34),(2390,p347),(5500)
Dist: Alaska to Puget Sound (2049,pl34),(2390)
Coll: Wash: Puget Sound region (2049,pl34)

Rhinoliparis barbulifer Gilbert (rock sucker) (2049,pl36)
Dist: Bering Sea to California (2049,pl36)

Rhinoliparis attenuatus Burke (rock sucker) (2049,pl36)
Dist: Bering Sea to California (2049,pl36)

Family: Trichodontidae--Sandfishes

Trichodon trichodon (Tilesius) - (sand fish) (2049,p72),(2390,p215-16)
Dist: Kamchatka, to Oregon (2049,p72),(2390)
Coll: Wash: Coastal, Puget Sound, San Juan Islands (2049,p72), Grays Harbor, Seaview (2049,p72); Ore: Coastal, Yaquina Bay, Winchester Bay near Reedsport (2049,p72)

Family: Ammodytidae--Sand lances

Ammodytes hexapterus Pallas (sandlance) (2390,p395-6),(5500)
Ammodytes personatus (obsolete name)
Ammodytes tobianus personatus (obsolete name)
Dist: Alaska to California (2049,pl38), (2033,p322)
Coll: Wash: Coastal, Seattle, Pt. Ludlow, Pt. Angeles, San Juan islands, Mouth Sikiu R., Clallam Co., Neah Bay, Cape Flattery, Grays Harbor; Ore: Coastal, Tillamook Head, Three Arch Rocks near Oceanside, Yaquina Head, Ecola Rocks, Siuslaw R., Cape Arago (2049,pl38)
Hab: Marine (2049), Intertidal (2033,p322)
Remarks: Abundant, of commercial value as bait; forming the bulk of the food for many of our food fishes (2049,pl38). Occurs in large schools; may bury itself in sand of beaches, feeds on plankton, particularly small crustaceans; eaten by chinook, coho, ling cod, halibut, and many other fishes (2390)

Family: Bathymasteridae--Ronquils

Bathymaster signatus Cope (searcher) (2390,p365-6),(5500)
Dist: Washington to Bering Sea, Rare. (2390)

Ronquilus jordani (Gilbert) - (ronquil) (2049,pl38),(2390,p364-5),(5500)
Dist: Alaska to Puget Sound (2049,pl38)
Coll: Wash: Puget Sound, Seattle, Admiralty Inlet and Hoods Canal, Possession Sound, Saratoga Passage, San Juan Islands, Coastal, Neah Bay, Str. Juan de Fuca (2049,pl38), 48°21'N,123°14'W at 48 fms (2390)
Hab: Marine
Misc: Common, no commercial value

Family: Clinidae--Clinids

Gibbonsia elegans montereyensis Hubbs - (spotted kelpfish) (2049,pl38)
Dist: Vancouver Island, B.C. to Southern California (2049,pl39)
Coll: Recorded north of Calif. only from Vancouver Isl., B.C. (2049,pl39)
Hab: Marine
Misc: No commercial value

Gibbonsia metzi Hubbs - (striped kelpfish) (2033, p321), (2390, p361-2), (5500)
Dist: Vancouver Island to Southern California (2390)
Hab: Intertidal (2033, p321)
Remarks: Inhabits shallow water, usually tidepools (2390)

Gibbonsia montereyensis Hubbs - (crevice kelpfish) (2033, p321), (2390, p362-3), (5500)
Dist: Vancouver Island to Southern California (2390)
Hab: Intertidal (2033, p321), Tidepools (2390)

Heterostichus rostratus Girard - (kelpfish) (2049, pl39), (2033, p321), (2567, pl45)
Dist: B.C. and Southern California and Guadalupe Islands (2049, pl39), (2567, pl45)
Coll: Recorded north of California only from B.C. (2049, pl39)
Hab: Intertidal (2033, p321), inshore around kelp and eelgrass (2567, pl45)

Family: Anarhichadidae--Wolffishes

Anarhichthys ocellatus Ayres (wolf eel) (2049, pl41), (2341), (2567, pl48), (2390, p366-7), (5500)
Dist: Alaska to Monterey, Calif. (2049, pl41), (2567, pl48), (2390)
Coll: Wash: Puget Sound, Hoods Canal near Holly and Potlatch, Pt. Townsend (2049, pl41), Coastal, Neah Bay (2049, pl41); Ore: Coastal, Haystack Rock near Pacific City, Port Orford (2049, pl41)
Hab: Marine
Remarks: Eats crustaceans, sea-urchins, mussels, clams, and other hard-shelled invertebrates as well as fishes (2390)
Misc: Common, no commercial value

Family: Pholidae--Gunnels

Apodichthys flavidus Girard (Penpoint gunnel, ronquil) (2049, pl39)
Dist: Alaska to Pt. Conception (2049, pl39), (2390)
Coll: Wash: Puget Sound region, Ft. Steilacoom, Seattle, Meadowdale, Pt. Ludlow, Deception Pass, San Juan Islands, Sucia Islands, Sikiu R. mouth, Clallam Co., Coastal, Neah Bay, Cape Johnson, La Push, Quillayute R. mouth, Cape

Apodichthys flavidus (continued)
Elizabeth near Taholah; Ore: Coastal, Cape Falcon, Cape Foulweather, Yaquina Head, Ecola Rocks, Coos Bay, Cape Arago (2049,pl39)
Hab: Marine, lives in eel grass (2390)
Remarks: Eats small crustaceans and molluscs (2390)
Misc: Common

Pholis clemensi - (gunnel) - (5511,p933-39)
Dist: South B.C. to Straits of Juan de Fuca (5511)
Remarks: Taken among rocks in 40-90 ft of water. Temperature of water 8.8 - 10.5°C, Salinity ca. 28‰

Philos laeta (Cope) - (bracket blenny, crescent gunnel) (2049,pl39), (2390,p381-2),(5500)
Dist: Alaska to California (2049,pl39),(2390)
Coll: Wash: Puget Sound region, Manchester Rks., Seattle, Bainbridge Isl., Meadowdale, Pt. Orchard, Hoods Canal near Holly, Possession Sound, San Juan Islands, Coastal, Neah Bay, Cape Johnson, La Push, Quillayute R. mouth, Ore: Coastal, Cape Falcon, Cape Foulweather, Yaquina Head, Ecola Rocks, Cape Arago (2049,pl39)
Hab: Marine, found in shallow water, frequently intertidal zone, around seaweeds and in tidepools. Sometimes found at 30-40 fms (2390)
Misc: Common (2049,pl39),(2390)

Pholis ornatus (Girard) - (saddled blenny, saddleback gunner) (2049,pl39) (2390,p380-1),(5500)
Dist: Alaska to San Francisco (2049,pl39)
Coll: Wash: Puget Sound region, Ft. Steilacoom, Deception Pass, Hoods Canal near Holly, Pt. Ludlow, Whidby Island, Admiralty Head, Port Townsend, Pt. Angeles, San Juan Islands, "New Orcas Islands," Coastal, Cape Flattery, Cape Johnson, La Push, Quillayute R. mouth, Cape Elizabeth near Taholah, Grays Harbor, Shoalwater, (Willapa Bay), Columbia River mouth; Ore: Coastal, Cape Falcon, Tillamook Bay, Three Arch Rocks near Oceanside, Nestucca Bay, Yaquina Head, Yaquina Bay, Ecola Rocks, Coos Bay (2049,pl39)
Hab: Found usually on muddy bottoms near mouth of streams. 10-20 fms, sometimes in intertidal zone. (2390), marine
Misc: Eats crustaceans and molluscs (2390), Common

CHORDATA - FISHES - Pholidae

Pholis schultzi Hubbs (northern Blenny) (2049, pl39), (5521)
Dist: Washington to California (2049, pl39)
Coll: Wash: Puget Sound region, reef at lighthouse, west shore, San Juan Isl., Coastal, Cape Johnson, La Push, Quillayute R. mouth, Cape Elizabeth near Taholah; Ore: Coastal, Yaquina Head, Ecola Rocks, Cape Arago; Calif: Del Norte Co. (2049, pl39)
Misc: Not rare (2049, pl39)
Hab: Marine, taken over rocky bottoms exposed to waves, eel grass and kelp present (5521)

Xerepres fucorum (Jordan and Gilbert) - (fucus blenny, rockweed gunnel) (2049, pl39), (2033, p322), (2390, p383-4), (5500)
Dist: Puget Sound to San Clemente Island, Calif. (2049, pl39)
Coll: Wash: Puget Sound region, San Juan Islands, Coastal, Neah Bay, Cape Johnson, La Push; Ore: Coastal, Cape Foulweather, Yaquina Head, Ecola Rocks, Cape Arago (2049, pl39)
Hab: Marine, intertidal (2033, p322). Found in the seaweed *Fucus*.
Remarks: Biol: Eats small crustaceans and mollusks (2390)
Misc: Not rare (2049, pl39)

Family: Stichaenidae--Pricklebacks

Anoplarchus purpurescens Gill - (cockscomb prickleback) (2033, p321), (2390, p375-6), (5500)
Dist: Bering Sea to California (2390)
Coll: Calif: Central coast (2033, p321)
Hab: Intertidal, very common along coast, under rocks in intertidal zone (2390)
Remarks: Spawning in late winter or early spring (2390)

Anoplarchus purpurescens purpurescens Gill - (crested blenny) (2049, pl40)
Dist: Alaska to California (2049, pl40)
Coll: Wash: Ft. Steilacoom, Seattle, Pt. Townsend, Meadowdale, Deception Pass, Hoods Canal near Holly, Pt. Townsend, San Juan Islands, Friday Harbor and Brown Isl., Coastal, Cape Flattery, Cape Johnson, La Push; Ore: Coastal, Cape Foulweather, Yaquina Head, Cape Arago (2049, pl40)
Hab: Marine (2049, pl40)
Remarks: Common, no commercial value (2049, pl40)

CHORDATA - FISHES - Stichaenidae

Bryostemma decoratum
see Chirolophis polyactocephalus

Bryostemma nugator - Jordan and Williams (ornamented blenny)
(2049, pl40)
see Chirolophis nugator

Chirolophis nugator (Jordan and Williams) (mosshead prickleback)
(2033, p321), (5500), (2390, p374-5)
Bryostemma nugator Jordan and Williams (ornamented blenny)
(2049, pl40) (obsolete name)
Dist: Strait of Georgia to California (2390), (2049, pl40)
Coll: Wash: Coastal, San Juan Islands, Cape Johnson, La Push, opposite Quillayute Needles; Ore: Coastal, Cape Foulweather, Yaquina Head, Ecola Rocks, Cape Arago (2049, pl40)
Hab: Intertidal (2033, p321)

Chirolophis polyactocephalus Pallas (decorated prickleback, decorated blenny) (2390, p373-4), (5500)
Bryostemma decoratum Jordan and Snyder (obsolete name)
Dist: Bering Sea to Washington (2390)
Coll: Wash: Pt. Orchard, off Everett, Admiralty Inlet, Friday Harbor, Str. Juan de Fuca (2049, pl40)
Hab: Marine (2049, pl40)
Remarks: Not common. No commercial value (2049, pl40); not rare (2390)

Delolepis giganteus (Kittlitz) (giant wrymouth, blenny) (2049, pl41), (2390, 378-79), (5500)
Dist: Alaska to Oregon (2049, pl41), (2390)
Coll: Wash: Seattle, Whidby Island, Pt. Angeles; Ore: Coastal, Yaquina Bay, Heceta Head, Coquille River mouth (2049, pl41)
Hab: Marine (2049, pl41)
Remarks: Not rare. No commercial value (2049, pl41)

Epigeichthys atro-purpureus
see Xiphister atropurpureus

CHORDATA - FISHES - Stichaenidae

Leptoclinus maculatus (Fries) (shanny - prickleback, blenny) (2049, p141), (5520), (2408)
Dist: North Pacific southward to Puget Sound (2049, p141)
Coll: Wash: Orcas Island (2049, p141)
Hab: Marine (2049, p141), taken in British Columbia over hard sandy bottom at 180-300 ft. (5520)
Remarks: Probably common. No commercial value (2049, p141)

Lumpenus anguillaris (Pallas) - (snake eel) (2049, p141)
Dist: Alaska to California (2049, p141)
Coll: Wash: Seattle, off Everett, Whidby Island, Hoods Canal, Pt. Ludlow, Bellingham Bay, Whatcom Co., San Juan Islands, "New Orcas Islands," Pt. Angeles, Grays Harbor, Chinnok, Columbia R. mouth (2049, p141)
Hab: Marine (2049, p141)
Misc: No commercial value, common (2049, p141)

Lumpenus sagitta Wilmovsky - (Pacific snakeblenny) (2390, p371-2), (5500)
Dist: Bering Sea to California (2390)

Lyconectes aleutensis Gilbert - (red devil, dwarf wrymouth) (2049, p141), (2390, p379-80), (5500)
Dist: Aleutian Islands to Puget Sound (2049, p141)
Coll: Wash: Hoods Canal, San Juan Islands, Orcas Isl. (2049, p141)
Hab: Marine (2049, p141), Inhabits muddy bottoms (2390)
Remarks: Not common, no commercial value (2049, p141)

Phytichthys chirus (Jordan and Gilbert) - (ribbon prickleback) (2033, p321), (2390, p376), (5500)
Dist: Bering Sea to California (2390)
Coll: Calif: Central coast (2033, p321)
Hab: Intertidal (2033, p321), in shallow water of intertidal zone, under rocks (2390)
Remarks: Feeds on red and green algae (2390). Common (2390)

Phytichthys chirus chirus - (belted blenny) (2049, p140)
Dist: British Columbia to California (2049, p140)
Coll: Wash: Coastal, Pt. Ludlow, San Juan Islands, Friday Harbor, Neah Bay, La Push, Cape Johnson; Ore: Coastal, Three Arch Rocks near Oceanside, Cape Foulweather (2049, p140)
Hab: Marine (2049)
Remarks: Common, no commercial value (2049, p140)

CHORDATA - FISHES - Stichaenidae

Plagiogrammus hopkinsii Bean - (crisscross prickleback) (2033,p321)
Dist: California (2033,p321)
Hab: Intertidal (2033,p321)

Plectobranchus evides Gilbert - (bluebarred prickleback or black-and-white prickleback, barred blenny) (2049,p140),(5500), (2390,p372)
Dist: Washington to California (2049,p140), (2390)
Coll: Wash: Coastal, Hoods Canal, Holly, Possession Sound, Pt. Susan, Saratoga Passage, Columbia River; Ore: Coastal, Albatross Station 3064 (2049,p140)
Hab: Marine (2049,p140)
Remarks: Not common, no commercial value (2049,p140)

Poroclinus rothrocki Bean - (white barred blenny) (2049,p141),(5500), (2390,p368-9)
Dist: Alaska to California (2049,p141),(2390)
Coll: Wash: off Tulalip, Saratoga Passage, Pt. Susan (2049,p141)
Hab: Marine (2049), bottom dweller in intertidal area
Remarks: Rare, no commercial value (2049,p141)

Xiphister atropurpureus (Kittlitz) - (black prickleback) (5500)
Epigeichthys atro-purpureus (Kittlitz) - (rock blenny) (2049,p140), (2033,p321),(2390,p377-8) (obsolete name)
Dist: Alaska to California (2049,p140)
Coll: Wash: Coastal, Pt. Ludlow, San Juan Islands, Neah Bay, Cape Johnson, La Push; Ore: Coastal, Cape Foulweather, Yaquina Head, Cape Arago (2049,p140)
Hab: Marine (2049), Intertidal(2033,p321) found under rocks high on the beach when tide recedes (2390)
Remarks: Common, slight commercial value (2049,p140)

Xiphister mucosus (Girard) - (rock blenny) (2049,p140),(2033,p321), (2567,p147),(2390,p376-7),(5500)
Dist: Alaska to California (2049,p140),(2567,p147)
Coll: Wash: Puget Sound region, Coastal, Pt. Ludlow, Pt. Townsend, San Juan Islands, Brown Is. at Friday Harbor, Neah Bay, Cape Johnson, La Push; Ore: Coastal, Three Arch Rocks near Oceanside, Cape Foulweather, Yaquina Head, Ecola Rocks, Cape Arago, Port Orford (2049,p140)
Hab: Marine (2049), Intertidal (2033,p321),(2567,p147), young are taken in upper intertidal zone. Adults in lower intertidal zone to 10 fms (2390)
Remarks: Eat mainly algae (2390). Common, slight commercial value (2049,p140)

Family: Ptilichthyidae--Quillfishes

Ptilichthys goodei Bean (quill fish) (2049, pl41),(2390 ,p367-8),(5500),(2408)
Dist: Alaska to Puget Sound (2049, pl41),(2390)
Coll: Wash: Puget Sound, Friday Harbor (2049, pl41)
Hab: Marine
Misc: Not common, no commercial value (2049, pl41)

Family: Zoarcidae--eelpouts

Aprodon cortezianus Gilbert - (bigfin eelpout) (2390, p386-7),(5500)
Dist: Queen Charlotte Sound to Southern California (2390)

Bothrocara mollis Bean - (eelpout) (2049, pl42)
Dist: Queen Charlotte Islands to California (2049, pl42)
Coll: This species has not been recorded in Wash. or Ore. (2049, pl42)
Hab: Marine (2049)
Remarks: No commercial value (2049, pl42)

Bothrocara remigera Gilbert - (eelpout) (2049, pl42)
Dist: Washington to California (2049, pl42)
Coll: Wash: Albatross Station 3075 (2049, pl42)
Hab: Marine (2049)
Remarks: No commercial value (2049, pl42)

Embryx crotalinus (Gilbert) - (snakehead eelpout) (2049, pl41),(5500)
Dist: Northern Pacific to California (2049, pl41)
Coll: This species has not been recorded from Wash. and Ore. (2049, pl41)
Hab: Marine (2049)
Remarks: Rare, no commercial value (2049, pl41)

Furcimanus diapterus (Gilbert) (2049, pl42),(2048)
See Lycodes diapterus

Lycodapus mandibularis Gilbert - (osteichthyes) (2341)
Dist: Oregon (2341)

Lycodes brevipes Bean - (shortfin eelpout) (2049, pl42),(2390, p389-90), (5500)
Dist: Aleutian Islands to Puget Sound (2049, pl42),(2390)

Lycodes brevipes (continued)
Coll: Wash: Admiralty Inlet, San Juan Islands, East Sound (2049,pl42), 50°45'N,127°16'W at 138 fms (2390)
Hab: Marine (2049)
Remarks: Not rare, no commercial value (2049,pl42)

Lycodes diapterus Gilbert - (blackfin eelpout) (2390,p387-8),(5500)
Furcimanus diapterus (obsolete name) (2049,pl42),(2408)
Dist: Bering Sea to California (2390),(2049,pl42)
Coll: Wash: Elliott Bay, Saratoga Passage, off Tulalip, near Gedney Isl., Albatross Station 3067 at 72 fms(2049,pl42)
Hab: Marine (2049), habitat in deeper waters 30-391 fms (2390)
Remarks: Rare, no commercial value (2049,pl42)

Lycodes jordani Evermann and Goldsborough - (eelpout) (2049,pl42)
Dist: Alaska to California (2049,pl42)
Coll: Puget Sound record cannot be verfied (2049,pl42)
Hab: Marine (2049)
Remarks: Rare, no commercial value (2049,pl42)

Lycodes palearis Gilbert - (wattled eelpout) (2390,p388-9),(5500)
Dist: Bering Sea to Oregon (2390)
Remarks: Spawns in winter months; eats small bivalves and shrimps (2390)

Lycodopsis pacifica (Collett) - (black belly eelpout) (2049,pl42),(2390, p385-6),(5500)
Dist: Alaska to California (2049,pl42)
Coll: Wash: Coastal, Seattle, Admiralty Inlet, and Pt. Townsend, Everett, Saratoga Passage, San Juan Islands, Cape Flattery (2049,pl42)
Hab: Marine (2049), has been taken from 10-200 fms (2390)
Remarks: Common, no commercial value (2049,pl42),eats marine worms, crustaceans, small bivalves and brittlestars(2390)

Lycogramma brunnea (Bean) - (eelpout)(2049,pl42)
Dist: Alaska to California (2049,pl42)
Coll: This species has not been recorded in Wash. or Ore. (2049,pl42)
Hab: Marine (2049,pl42)
Remarks: Not common, no commercial value (2049,pl42)

Family: Scytalinidae--Graveldivers

Scytalina cerdale Jordan and Gilbert - (graveldiver, burrowing blenny) (2049, p141), (2390, p384-5), (5500), (2033, p322)
Dist: Aleutian Islands to Monterey Co., California (2049, p141)
Coll: Wash: Coastal, Puget Sound, San Juan Islands, Waadda Is., Neah Bay (2049, p141)
Hab: Marine (2049), intertidal (2033, p322), Occurs in tidepools and beaches in loose gravel and stones and burrows in the sand (2390)
Misc: Not common, no commercial value (2049, p141)

Family: Zaproridae--Prowfish

Zapora silenus Jordan - (highbrow, prowfish) (2049, p138), (2390, p233-34)
Dist: Sitkalidak Island, Alaska to Puget Sound (2049, p138)
Coll: Puget Sound--Nanaimo Harbor, B. C. (2049, p138)
Hab: Marine
Remarks: Rare, no commercial value (2049, p138), has been taken between 16 - 195 fms (2390)

Family: Brotulidae--Brotulas

Brosmophycis marginatus (Ayres) - (Red brotula, brotuloid) (2049, p142), (2390, p393-4), (5500)
Dist: Petersburg, Alaska to San Pedro, Calif. (2049, p142)
Coll: Wash: Puget Sound, Elliott Bay, Hoods Canal near Holly, off Everett, Gedney Island, Possession Sound (2049, p142)
Hab: Marine
Remarks: Apparently lives in moderate depths (2390)
Misc: Not rare, no commercial value (2049, p142)

Family: Stromateidae--Butterfishes

Icichthys lockingtoni Jordan and Gilbert - (brown rudderfish, medusa fish) (2390, p232), (2033, p320)
Dist: Gulf of Alaska to northern and Central Calif. (2033, p320), (2390)
Misc: Often found in association with jellyfish (2390)
Hab: Intertidal (2033, p320)

CHORDATA - FISHES - Stromateidae

Palometa simillima Ayres (California pompano) (2567, p81), (2390, p231-2)
Peprilus simillimus (Ayres) (2049, p71)
Dist: B.C. to Cedros Island, Baja California (2567, p81), (2390)
Coll: Puget Sound: Pt. Ludlow (2049, p71); Ore: Coastal, (2049, p71); Calif: San Diego(2049, p71)
Hab: Marine (2567, p81), (2390), (2049, p71)
Remarks: Good eating fish(2390)
Misc: Slight commercial value, no commercial value in Wash. or Ore. (2567, p81), (2390), (2049, p71)

Family: Tetragonuridae

Tetragonurus cuvieri Risso (smalleye and squaretail) (2390, p236-7)
Dist: Vancouver Island, B.C. to southern California (2390)
Remarks: Eats only jellyfishes and combjellies, reported to be poisonous in the Mediterranean Sea (2390)

Family: Icosteidae--Ragfishes

Icosteus aenigmaticus (2390, p235)
Acrotus willoughbyi Bean (2049, p71)
Dist: B.C. to San Diego, Calif. (2049, p71), (2390), Petersburg, Alaska to San Pedro, Calif. (2049, p71)
Coll: Puget Sound: Gig Harbor and Whidby Isl., Pt. Townsend, San Juan Islands (2049, p71); Wash: Coastal, Damon (2049, p71), Columbia River mouth, Ilwaco (2049, p71); Ore: Astoria (2049, p71)
Hab: Marine
Misc: Not rare, no commercial value (2049, p71)

Family: Sphyraenidae--Barracudas

Sphraena argentea Girard - (barracuda) (2049, p70), (2567, p80), (2390, p238-239)
Dist: Alaska to Magdalena Bay, Baja Calif. (2567, p80), Puget Sound to Gulf of California (2049, p70)
Coll: Puget Sound: Gig Harbor, Pt. Ludlow (2049, p70)
Hab: Marine
Remarks: Found off California coast; it spawns in June in open ocean. Good sport fish (2390)
Misc: Common southward, little commercial value north of Calif. Very commercially important in Calif. (2049, p70), (2567, p80)

Family: Atherinidae--Silversides

Atherinopsis californiensis californiensis Girard - (jack smelt) (2049,p70),(2567,p76)
Dist: Northern Oregon to lower California (2049,p70),(2567,p76)
Coll: Ore: Coastal, Yaquina Bay, Coos Bay (2049,p70)
Hab: Marine
Misc: Common, slight commercial value in Oregon (2049,p70)

Atherinops affinis oregonia Jordan and Snyder - (bay smelt) (2049,p70), (5501),(5539)
Dist: Northern Oregon to Central California (2049,p70)
Coll: Ore: Coastal, Tillamook Bay, Coos Bay, Yaquina Bay, Yachats R. (2049,p70)
Hab: Marine
Misc: Common, slight commercial value (2049,p70)
Remarks: Fertilized eggs developed at all temps below 26.8°C. Maximum hatching temp around 27° - 28.5°C and not below 12.8°C. Spawning in February (5501)
Spawn in late May to early July. Eggs attached to eelgrass which was covered by a few feet of water at low tide, in Coos Bay, Ore. Migrate to upper end of the bay. Usually reach sexual maturity in 3 years. Evidence seems to indicate that this fish does not go into the ocean but stays in bays (5539)
A. affinis became more acclimated to heat than to cold. Natural temp for La Jolla area summer water = 20°C, for winter, 18°C (2828)

Order: Pleuronectiformes (Heterosomata)
Family: Bothidae--left-eye flounders

Citharichthys sordidus (Girard) - (Pacific sand dab, mottled sand dab) (2049,p66),(2341),(2567,p52),(2416),(5633),(2390,p180-1)
Dist: Kiska Island (Aleutian chain) to Lower California (2049,p66), (2567,p52),(2390)
Coll: Wash: Puget Sound region, Seattle, off Everett, Saratoga Passage, San Juan Isl., Pt. Angeles, Str. Juan de Fuca; Ore: off Cascade Head, off Newport (2049,p66)
Remarks: Common southward, slight commercial value (2049,p66), carnivorous (2390), popular fish on market. Taken commercially from Bodega Head to Monterey Bay. Occurs from 10-100 fms. Spawns from July to early Sept., peak of season is in Aug. Eggs are pelagic, found in deep water, eats mainly anchovies (2416)

CHORDATA - FISHES - Bothidae

Citharichthys stigmaeus Jordan and Gilbert - (speckled sand dab)
(2049,p66),(2390,pl81-2),(2567,p52),(2033,p320),(2341)
Dist: Prince William Sound to California (2049,p66),(2390)
Coll: Wash: Puget Sound region, Seattle, Hoods Canal near Holly, Admiralty Inlet, Saratoga Passage, off Bellingham, San Juan Islands, Coastal, Grays Harbor; Ore: Coastal, Yaquina Bay, Coos Bay (2049,p66)
Hab: Marine (2049,p66), Intertidal (2033,p320)
Remarks: Common, slight commercial value (2049,p66), carnivorous (2390)

Family: Pleuronectidae--right eye flounders

Atheresthes stomias (Jordan and Gilbert) - (arrow-tooth halibut, turbot, bastard halibut, French sole) (2049,p66),(2390,pl83-4), (2567,p57)
Dist: Bering Sea to California (2049,p66),(2567,p57)
Coll: Wash: Puget Sound region, Elliott Bay, Saratoga Passage, San Juan Islands, Str. Juan de Fuca; Ore: Coastal, off Tillamook Rock (2049,p66), 48°31'N,124°39'W at 98 fms (2390)
Hab: Marine (2049,p66)
Remarks: Common northward, no commercial value (2049,p66), (2567,p57), slight commercial value; used for mink feed. Eats shrimps and herring (2390)

Embassichthys bathybius (Gilbert) - (deep sea sole) (2341),(2390,p201-2)
Dist: British Columbia to California
Coll: Ore: (2341) 48°14'N,125°02'W at 116 fms (2390)

Eopsetta jordani (Lockington)- (English sole, brill, petrale sole)
(2049,p67),(2567,p59),(2571,p48),(2390,pl88-9),(5525),(5528)
Hippoglossoides jordani (2416) (obsolete name)
Dist: Alaska to Baja California (2567,p59),(2390),(2049,p67)
Coll: Wash: Coastal, Cape Flattery, La Push, off Grays Harbor; Ore: Coastal, off Newport, Pt. Orford (2049,p67)
Hab: Marine (2049,p67)
Remarks: Common, slight commercial value (2049,p67); food--euphausiids, herring, sand lance and anchoves (2390); spawns from Nov. to March (5525) no evidence of north-south migration (5528); Early development (3375); Fecundity, spawning and early life history (3379) See also Vol. I, Chap. 20.

See also Chapter 20
p. 262

Glyptocephalus pacificul (2416) obsolete
see *Microstomus pacificus*

Glyptocephalus zachirus Lockington - (witch sole) (2390, p202)(rex sole, long-finned sole) (2049, p69), (2341), (2567, p65), (2416)
Dist: North Pacific south to San Pedro Bay (2049, p69), (2567, p65)
Coll: Wash: Seattle, Possession Sound, Hoods Canal near Holly, Saratoga Passage, Str. of Juan de Fuca; Ore: off Cascade Head and off Newport (2049, p69), 48° 30'N, 124°36'W at 116 fms (2390)
Hab: Marine (2049, p69), lives in fairly deep water (2390)
Remarks: Common, slight commercial value (2049, p69), (2567, p65), comprises 5% of Calif. sole catch (2567, p65)

Hippoglossoides elassodon Jordan and Gilbert - (sole) (2049, p67), (2390, p185-6)
Dist: Alaska to Washington (2049, p67), (2390)
Coll: Wash: Puget Sound region, Admiralty Inlet, Possession Sound, Saratoga Passage, San Juan Islands, Str. of Juan de Fuca, Coastal, Albatross Station 3460 (2049, p67), 48°25'N, 124°10'W, depth 53 fms (2390)
Common in Str. of Georgia in moderately shallow water (2390)
Hab: Marine (2049, p67)
Remarks: Common, slight commercial value (2049, p67), (2390), food: annelids, crustaceans and molluscs (2390)

Hippoglossoides exiles (Jordan and Gilbert) (2416) (obsolete)
See *Lyopsetta exilis*

Hippoglossus stenolepis Schmidt (alabato, northern halibut, pacific halibut) (2049, p66), (2341), (2567, p56), (2442), (2390, p184), (2561, p43-44)
Dist: Bering Sea to California (2049, p66), (2567, p56), (2571, p43), (2390)
Coll: Wash: Puget Sound region, off west coast of Whidby Island, Str. Juan de Fuca (2049, p66), Coastal, Cape Flattery (2049, p67); Ore: Coastal, Tillamook Head and Heceta Bank, off Yaquina Head, off Yaquina Bar, off Coos Co. (2049, p67)
Remarks: At one time it formed a great fishery of Wash.; stock now somewhat depleted, but abundant northward (2049, p66), (2567, p56), (2571, p43), (2390), Biol: Spawn from Nov. to

See also Chapter 20
p. 263

Hippoglossus stenolepis (continued)
Jan. from 150-225 fms; food: fishes, crabs, clams, squids and other invertebrates (2390, p185), stomach contents (2442, p94-96); Enemies: sea-lion (Eumetopias stelleri), "ground shark," lamprey, and other halibut (2442). Also see Vol. I, Chap. 20.
Hab: Occurs from very shallow waters to 600 fms, usually 30-225 fms.

Isopsetta isolepis (Lockington) - (butter sole) (2390, p195), (rock sole, scaly-finned flounder) (2049, p68), (2416), (2567, p61)
Parophrys isolepis (obsolete name) (2416)
Dist: Alaska to California (2049, p68), (2567, p61), (2390)
Coll: Wash: Puget Sound region, Seattle, San Juan Islands; Ore: (2049, p68)
Hab: Marine (2049, p68), Found in deep water. Dredged 5-15 fms off central Oregion (3412)
Remarks: Common, no commercial value (2049, p68), (2567, p61), (2390); Bio: Spawn from March to late April (2390), Eats crustaceans and molluscs (2416)

Lepidopsetta bilineata (Ayres) - (rough back sole, rock sole, flounder) (2049, p68), (broad fin sole) (2567, p63), (2390, p197-8), (2416)
Dist: Japan to Alaska to California (2049, p68), (2567, p63)
Coll: Wash: Puget Sound region, Seattle, Meadowdale, Hoods Canal near Holly, Pt. Ludlow, Admiralty Inlet, San Juan Islands, Port Angeles, Coastal, Cape Flattery; Ore: Coastal, Cannon Beach (2049, p68)
Hab: Young are common in shallow waters, usually in sandy or gravelly areas off eelgrass beds.
Remarks: Abundant, commercial value (2049, p68), (2567, p63); Bio: Spawn from late winter to early spring, eats brittle stars, small crabs, shrimps, clam siphons and other invertebrates and sand lance (2390)

Lyopsetta exilis (Jordan and Gilbert) - (slender sole, rough sole) (2049, p67), (2341), (2416), (2567, p58), (2390, p187)
Hippoglossoides exilis (Jordan and Gilbert) (2416), (obsolete name)
Dist: Alaska to Baja California (2049, p67), (2567, p58), (2390)
Coll: Wash: Puget Sound region, Admiralty Inlet, Possession Sound, Saratoga Passage, San Juan Islands, Coastal; Ore: Coastal, off Cascade Head, Yaquina Bay (2049, p67), 49°11'N, 123°54'W at 54 fms (2390)

Lyopsetta exilis (continued)
Hab: Occurs in rocky areas, usually in moderate depths (2416)
Remarks: Common, slight commercial value (2049, p67), (2567, p58), (2390); Eats small fish and crustaceans. Spawn in spring, in deep water (2416)

Microstomus pacificus (Lockington) - (dover sole, Chinese sole, slippery sole, slime sole) (2049, p68), (2341), (2567, p64), (2416), (2572), (2390, p200-201), (5528)
Glyptocephalus pacificus (2416) (obsolete name?)
Dist: Alaska to Baja California (2049, p69), (2567, p64), (2572, p7)
Coll: Wash: Puget Sound region, Elliott Bay, Possession Sound, Saratoga Passage, Whidby Isl., Holmes Hbr., San Juan Islands, San Juan Channel, Str. Juan de Fuca; Coastal, Albatross Station 3343 (516 fms); Ore: Coastal, off Cascade Head and off Newport (2049, p69)
Hab: Deeper waters than most flat fish, on muddy bottoms (2567, p64), (2390)
Remarks: Common, sold primarily as mink feed (2390), slight commercial value (2049, p69); Bio: Spawn in Dec., Jan. and Feb. Larvae are pelagic eggs and young drift south and shoreward due to currents. Feeds on invertebrates, mainly those that inhabit mud (2572, p46-7). No evidence of north-south migrations but sole tagged in shallow water in summer were recovered in 200 fms in winter (5528), See also Vol. I, Chap. 20.

See also Chapter 20
p. 272

Parophrys isolepis (obsolete) (2416)
See Isopsetta isolepis

Parophrys vetulus Girard - (common sole, California sole, lemon sole, English sole) (2049, p68), (2341), (2416), (5541), (5528), (5522), (2453), (5523), (2567, p62), (2390, p194-5), (5542), (5543), (5545), (5546), (5547)
Dist: Alaska to Baja California (2567, p62), (2049, p68), found from 28°30'N, 115°00'W to 54°30'N, 164°W (2453)
Coll: Wash: Puget Sound region, Seattle, Admiralty Inlet, Pt. Townsend, Meadowdale, Possession Sound, Hoods Canal near Holly, Saratoga Passage, off Bellingham, San Juan Islands, Pt. Angeles and Str. of Juan de Fuca; Coastal, Grays Harbor; Ore: Columbia R. mouth, Astoria, Coastal, Tillamook Bay, Nestucca Bay, off Cascade Head and off Newport, Yaquina Bay, Coos Bay, Pt. Orford (2049, p68)

See also Chapter 20
p. 285

Parophrys vetulus (continued)
Misc: Value, number, tag study, etc. (5522) (5528) (5546) (5547)
Hab: (2390) (5522) (5523)
Life Cycle, Biol: (2390) (5522) (5523) (2453) (5528) (5541) (5542) (5546) (5547) (2686, p17)
Phys: (2453) (5522)
Also see Vol. I, Chap. 20.

Platichthys stellatus (Pallas) (starry flounder) (2033, p320) (2566, p60) (2567, p66) (2390, p203) (2416) (2566, p60)
Pleuronectes stellatus (obsolete name) (2416)
Dist: Alaska to Calif. (2566, p60)
Hab: Intertidal (2033, p320), various types of bottoms in depths from few inches to 150 fms, avoids rock (2566, p60), usually in shallow waters on sandy bottoms.
Temp: Embryological development in 68 hrs at 12.5°C (2566, p60)
Remarks: Slight commercial value (2566, p60); spawn in late winter and early spring; young move into streams; food: crabs, shrimps, worms, clams, and clam siphons, small molluscs and small fish (2390)
Food and Feeding in Humboldt Bay (3374)

Platichthys stellatus rugosus Girard (starry flounder) (2049, p68)
Dist: Alaska to Calif. (2049, p68)
Coll: Wash: Puget Sound region, Seattle, Meadowdale, Pt. Ludlow, Hoods Canal near Holly, San Juan Islands, Pt. Angeles, Str. of Juan de Fuca, coastal, Cape Flattery, Quillayute R. mouth, beach at La Push, Quinault R. mouth, Grays Harbor; one 6-inch speciman at Kalama, Wash. (fresh water); Ore: Coastal, Tillamook Bay, Nestucca Bay, Yaquina Bay, Siuslaw R. and Ten Mile Cr., Coos Bay (2049, p68)
Hab: Marine (2049, p68)
Remarks: Common, commercial value (2049, p68)

Pleuronichthys coenosus Girard (sole, c-o turbot) (2049, p67) (2567, p69) (2390, p192) (2416)
Dist: Alaska to Calif. (2049, p67) (2567, p69) (2390)
Coll: Wash: Puget Sound region, Seattle, Port Madison, Hoods Canal near Holly, San Juan Islands, Str. of Juan de Fuca (2049, p67)
Hab: Young found in shallow waters; adults in deeper waters (2390); feed on algae; spawn in spring (2416)
Remarks: Common, slight commercial value (2049, p67)

Pleuronichthys decurrens Jordan and Gilbert (curlfin turbot) (2049, p67) (2567, p68) (2390, p191)
Dist: Alaska to Calif. (2049, p67) (2567, p68) (2390)
Coll: B. C.: Rivers Inlet; Ore (occasionally) (2049, p67); dredged 5-10 fms off central Oregon (3412)
Remarks: Common southward, no commercial value (2049, p67)

Pleuronectes stellatus (obsolete name) (2416)
See Platichthys stellatus

Pleuronichthys verticalis (Jordan and Gilbert) (horny head turbot)
Dist: Oregon to Calif. (2341) (2416)
Coll: Calif: around Monterey Bay (2416)

Psettichthys melanostictus Girard (sand sole) (2049, p67) (2033, p320) (2341) (2416) (5524) (2567, p60) (2390, p189)
Dist: Alaska to Calif. (2049, p67) (2567, p60) (2390)
Coll: Wash: Puget Sound region, Seattle, off Bellingham, San Juan Islands, Str. Juan de Fuca, Coastal, Cape Flattery, La Push, Cape Elizabeth near Taholah, Grays Harbor; Ore: Columbia R. mouth, Astoria, Coastal, off Cascade Head and off Newport, Yaquina Head, Yaquina Bay, Cape Arago (2049, p67)
Hab: Usually on sandy bottoms
Remarks: Common, slight commercial value (2049, p67); eats crustaceans, worms and small molluscs; some eat anchovies (2390); eggs pelagic hatched in 5 days when water surface temp was 7-9 °C (5524)

Order: Echeneiformes
Family: Echeneidae--Remoras

Remora australis Bennett - (whale sucker)
Remilegia australis Bennett - (whalesucker) (2390, p205)
Dist: Vancouver Island to southern Calif; rare (2390)

Remora remora (Linnaeus) - (remora, shark sucker) (2049, p138)
Dist: Warm seas north to New York and north to Vancouver Island (2049, p138)
Coll: B. C.: Specimen taken off a sulphur bottom whale at Seechart, Vancouver Island, June 1907, by T. Kermode; now in Provincial Museum (2049, p138); Ore: Columbia River mouth (2049, p138)

CHORDATA - FISHES - Gobiesocidae

Order: Gobiesociformes
Family: Gobiesocidae--Clingfishes

Gobiesox meandricus Girard - (Northern clingfish) (2390,p396-7),(5500)
Caularchus meandricus (Girard) - (clingfish, suckfish) (2049,p211)
Sicyogaster meandrica (Girard) (flathead clingfish) (2033,p321),(2390,p397)
Dist: S.E. Alaska to southern California (2390,p396)
Coll: B.C. (2049,p211); Wash: Puget Sound region, Seattle, Pt. Ludlow, San Juan Islands (2049,p211), Coastal, Neah Bay, Cape Flattery, Cape Johnson, La Push, Reef opposite Quillayute Needles (2049,p211); Ore: Coastal, Cape Falcon, Cape Foulweather, Yaquina Head, Ecola Rocks, Cape Arago (2049,p211); Calif: Central (2033,p321), Pt. Arguello (2049,p211)
Hab: Marine, intertidal (2033,p321)
Remarks: Clings to rocks in intertidal zone; eats small crustaceans and molluscs (2390)
Misc: Common, no commercial value

Rimicola eigenmanni (Gilbert) - (slender clingfish) (2033,p321)
Dist: Central California (2033,p321)
Hab: Intertidal (2033,p321)

Rimicola muscuram (Meek and Pierson, 1895) - (kelp clingfish) (2390,p397-8), (5500),(5520)
Dist: B.C. to southern California (2390)
Coll: B.C.: Whidby Point, Fitz Hugh Sound, Little Beach, (5520), West coast of Vancouver Island (2390)
Hab: Inhabits littoral zone, adhering to rocks and shells; eat small invertebrates (2390)
Remarks: Taken among algae, over fine shell, sand, stone and rock bottom. Water 14°C and salinity 30‰ (5520)

Order: Tetradontiformes (Plectognathi)
Family: Molidae--Molas

Mola mola (Linnaeus) - (Ocean sunfish) (2049,p211),(2033,p322),(2567,p149), (2390,p400-401)
Dist: Southeastern Alaska southward in temperate and tropical seas of Atlantic and Pacific (2049,p211),(2567,p149)

Mola mola (continued)
Coll: Wash: Coastal, Destruction Island (2049,p211); Ore: Coastal, off Yaquina Head (2049,p211)
Hab: Intertidal (2033,p322)
Remarks: Eats jellyfish, crustaceans, molluscs, brittlestars and small fishes. Eggs are set free in open ocean (2390)

Order: Batrachoidiformes
Family: Batrachoididae--Toadfishes

Porichthys notatus Girard - (singing fish, midshipman) (2049,p142), (2033,p321),(2567,p144),(2390,p398-9)
Dist: Sitka, Alaska to Gulf of California (2049,p142),(2567,p144)
Coll: Puget Sound: St. Steilacoom, Albatross Station 4218, Gedney Island, Saratoga Passage, Possession Sound, Hoods Canal near Holly, San Juan Islands (2049,p142)
Hab: Marine, lives in both shallow and deep water. Avoids bays south of Pt. Conception (2567,p144), occurs from intertidal zone to 145 fms.
Misc: Common, no commercial value (2049,p142),(2567,p144). Guards masses of pea-sized yellow eggs beneath rocks (2033,p321), breeds in spring, adults eat fishes and crustaceans (2390).

Class: AVES

Although every effort has been made to ensure that checklists of the birds are complete, an exhaustive search of the literature has not been made with respect to the biology of these groups. Many of the species are widely distributed or migratory and the literature on them is scattered. Furthermore, their ability to maintain a constant body temperature makes them somewhat independent of variations in temperature like those which might be encountered from thermal pollution.

Arenaria interpres cinclus (Pallas) - (Pacific Ruddy turnstone) - (5631,p250)
Dist: Migrant from May 6-24 coastwise and in Sound region. More common on Washington coast in spring (5631).
Range: Breeds from Siberia to Alaska. Migrates down Pacific coast to Pacific islands (5631).
Remarks: Prefers rocky areas but often on sandy beach. Eats crustacea, worms and mollusks found under rocks (5631).

CHORDATA - AVES

Brachyramphus marmoratum (Gmelin) - (marbled murrelet) - (2341), (2336, p83), (5631, p321-2)
  Brachyramphus marmoratus marmoratus (Gmelin) (5631)
    Dist: B. C., Washington, and Oregon (2341), (2336). Common resident along coast in Sound area (5631).

Calidris canutus rogersi (Matthews) - (Pacific Knot) - (5631, p267-8)
    Dist: Spring migrant on Washington coast from April 28 - May 24.

Cepphus columba Pallas (pigeon guillemot) (2341), (5585, p24-5), (5631, p319-20)
  Cepphus columba columba (Pallas) (5631)
    Dist: Arctic Ocean to Catalina Isl., Calif. (5585)
    Coll: Ore: (2341). Common resident in Puget Sound and islands of open coast. (5631)
    Remarks: Breed and nest in isolated colonies on Oregon coast. Prefer crevice in face of cliff for nest (5585). Eggs eaten by northwestern crow. Eats shellfish and soft sea animals. (5631)

Cerorhinca monocerata (Pallas) - (rhinorceros auklet) - (2341), (5631, p327-330)
    Dist: Washington and Oregon (5631), (2341). Common summer resident from April through October, on islands. Occasionally seen in winter offshore. Also seen as migrant. (5631)
    Remarks: Lay eggs in burrow. Solitary bird of open sea. Comes to shore only to nest. Nests at night. Eats candlefish, smelt and other fishes. (5631)

Charadius hiaticula semipalmatus (Bonaparte) - Semipalmated Ringed Plover. (5631, p243-4)
    Dist: Arctic to So. America. Migrant on Puget Sound and coastwise. Less common in spring in Puget Sound.
    Remarks: Feed on mud flats at low tide. Nest on arctic coast of America and winter in South America (5631)

Colymbus caspicus californicus (Heerman) - (American Eared Grebe) - (5631, p58-9)
    Dist: Winter on Puget Sound and from Columbia River north to Whidby Island. Summer goes inland.
    Remarks: Once hunted extensively for plumage which was used to

Colymbus caspicus californicus (continued)
decorate hats, capes and muffs, now protected by law. Nests in summer range. Eats aquatic insects and larvae, Beetles, tadpoles, small frogs, shrimps and water plants, sandfleas (5631).

Colymbus grisegena holböllii (Reinhardt) - (Holboell Red-necked Grebe) (5631, p54-55)
Dist: Winters in Puget Sound and along coast from Blaine and Orcas Island, south to Columbia River (5631).
Remarks: Nests in eastern Washington in May. Eats crustaceans, aquatic insects, mollusks, small fish or minnows, tadpoles, salamanders and vegetable substances (5631).

Crocethia alba (Pallas) - Sanderling - (5631, p282-83)
Dist: Winters along Arctic coast. Found along Washington coast in spring and fall during north and south migrations.
Remarks: Occurs in flocks of a few to 500. Eats marine worms, minute shell fish, various crustaceans, and insects.

Cyclorrhynchus psittacula (Pallas) - parakeet auklet - (2341), (5631, p327)
Dist: Oregon; rare in Washington (2341), (5631)
Remarks: Lays eggs on bare rock in crevice or cranny (5631)

Diomedea albatrus Pallas - short-tailed albatross - (2341), (5631, p67-8)
Dist: British Columbia to southern California.
Coll: Ore: (2341)

Diomedea immutabilis Rothschild - Laysan albatross - (2341)
Dist: Ore: (2341)

Diomedea nigripes Audubon - black-footed albatross - (2341), (5631, p66-7)
Dist: Well offshore. Records scanty but off Washington coast at least from April 14 - Oct. 30. Oregon (2341), (5631).
Remarks: Observed by fishing boats, which they follow looking for scraps of fish (5631)

Fratercula corniculata (Naumann) - horned puffin - (2341), (5585, p18-20), (5631, p330-331)
Dist: Casual visitor along coast of Washington in winter. (5631). Oregon (2341)

CHORDATA - AVES

Fulmarus glacialis (Linnaeus) - fulmar - (2341),(5631,p72-74)
Fulmarus glacialis rodgersii (Cassin)
Dist: Common migrant and winter resident off Washington coast from Oct. 9 to April 20. (5631) Oregon (2341)
Remarks: Oceanic in habit. Seen shoreward only as result of storms at sea (5631).

Gavia immer elasson (Bishop) - Common Loon - (5585,p12-13),(5631, p48-51)
Dist: Northern part of Northern Hemisphere. Breeds from Alaska to Greenland, south to Northern California and Nova Scotia (5585)
Remarks: Seen at sea at night. Eats fish. Winters on Puget Sound and Washington coastal waters. Eat principally fish also frogs, small reptiles, leaches, insects and aquatic vegetation. Indians used to eat the loon. Today used mainly for aesthetic value (5632).

Gavia stellata (Pontoppidan) - Red-throated Loon - (5631,p52-3)
Dist: Winters on Puget Sound and along Washington coast to Columbia River. Reaches California (5632).
Remarks: Common on salt water during spring migration. Eats leeches, crustaceans, shrimps, insects, mollusks, fish and fish spawn and some aquatic plants (5632).

Haematopus bachmani (Audubon)--Black Oyster catcher - (5631,p241-3)
Dist: Permanent resident on rocky coasts and offshore islets along Washington (5631)
Remarks: Breeds on smaller outlying rocks in May and June. Eggs preyed upon by raven. Eats mainly limpets, mussels, chitons and young abalones, also marine worms, crustaceans and barnacles (5631).

Larus argentatus Pontoppidan - Herring gull - (2341),(5631,p296-99),(5661)
Larus argentatus smithsonianus (Coves)
Dist: Migrant and winter resident on coast. Also found in Puget Sound and lower Columbia River. Oregon (2341)
Remarks: Eats fish, seashore life, carrion and refuse. Along with glaucous-winged gull, accounts for 39% loss of herring spawn within first 3 days after spawning (5661).

CHORDATA - AVES

Larus californicus Lawrence - California gull - (2341),(5631,p298-299)
Dist: Common spring, fall and winter migrant on open coast and sounds, Oregon (2341)
Remarks: Nests inland. Eats fish, garbage, insects, and field mice (when inland) (5631).

Larus canus Linnaeus - Mew gull - (2341),(5631,p302-3)
Larus canus brachyrhynchus (Richardson) (5631)
Dist: Common spring and fall migrant and winter resident in harbors and bays and Puget Sound and Oregon (2341)
Remarks: During rainy periods, goes inland to eat insects, worms and mice. On coast eats fish, crabs, clams, garbage, and cannery refuse. Also eats smelt (5631).
Note: May also be found under *Larus suckleyi* or *Rissa septentrionalism*; both names in disuse.

Larus delawarensis Ord - ring-billed gull - (2341),(5631,p301-2)
Dist: Spring and fall migrant along coast and Puget Sound, and in Eastern Washington, Oregon (2341)
Remarks: Nests in interior. Feeding habits similar to California gull (5631).

Larus glaucescens Naumann - Glaucous-winged gull - (2341),(5631,p292-4), (5661)
Dist: Washington (5631). Oregon (2341)
Remarks: Common permanent resident on salt water. Nests in late spring and summer. Is a valuable scavenger, picking up fish scraps from salmon canneries, garbage dumps, and packing houses. Also feeds on smelt during their upriver migration (5631).

Along with herring gull accounts for 39% loss of herring spawn in intertidal zone (5661).

Larus heermanni Cassin - Heermann's gull - (2341),(5631,p305-6)
Dist: Common non-breeding summer and fall visitant on sounds, bays, and harbors (5631). Oregon (2341)
Remarks: Unusual for reversal of usual course of migration. Nests on Pacific Coast of Mexico and then migrates north. Feeds mainly in open water or in vicinity of kelp beds. Food habits similar to other gulls. Also parasitizes pelicans, stealing fish from their bills (5631).

CHORDATA - AVES

Larus hyperboreus Gunnerus - Glaucous gull - (2341),(5631,p291-2)

Larus hyperboreus hyperboreus (Gunnerus) (5631)

Dist: Spring and fall migrant along coast and Puget Sound. Rare winter visiter (5631). Oregon (2341)

Larus occidentalis Audubon - Western Gull - (2341),(5631,p294-96)

Larus occidentalis occidentalis (Audubon)

Dist: Common permanent resident along Oregon and Washington coast and in Puget Sound.

Remarks: Does not breed any farther North than Washington. One breeding ground at Pacific City, Oregon. Eats small fish, clams, mussels, sewage, garbage, and cannery refuse; eats both eggs and young of nesting cormorants (5631).

Larus philadelphia (Ord) - Bonaparte's gull - (2341),(5631,p304-5)

Dist: Common spring and fall migrant. Fairly regular winter resident in sounds, bays, and harbors. Oregon (2341).

Remarks: Does not breed south of Cariboo district in B. C. Eats small fishes and other surface swimming aquatic life, also is insectivorous (5631).

Limnodromus griseus (Gmelin) - Eastern Dowitcher (5631,p275-6)

Dist: Very common on salt water in Washington from March 28 to May 23. Common on Puget Sound from July 7 to Nov. 10. Migrate north in spring, south in fall.

Lobipes lobatus (Linnaeus) - northern phalarope - (2341),(5631,p287-8)

Dist: Spring and fall migrant along coast, in Washington, Oregon (2341).

Remarks: Summers from Aleutian Islands to Northern Alaska. Eats marine worms and insects (5631)

Lunda cirrhata (Pallas) - tufted puffin - (2341),(5613,p44),(5585),(5631, p331-2)

Dist: Bering Sea to California. Common summer resident off coast of Washington (5631). Oregon (2341).

Remarks: Breed on islands, remains at sea all winter (5585). Usually found 1-2 miles offshore. Active in day. Nest in June. Eats tomcod, smelts, sardines, herring, perch, sea-urchins, mollusks, and algae. Enemies include eagles, waste oil, and storms (5631).

CHORDATA - AVES

Melanitta deglandi dixoni (Brooks) - Western White-winged Scoter (5631, p147-8)

Dist: Common migrants and winter visitant along coast and in Puget Sound area. Found south to Columbia River (5631).

Remarks: Eat herring eggs. Fall migration begins in October (5631).

Food habits and parasites in Humboldt Bay (3387)

Melanitta perspicilliata (Linnaeus) - surf scoter (5631, p148-150)

Dist: Migrant and winter resident in Puget Sound region and along coast. Non breeders remain all summer anywhere on salt water (5631).

Remarks: Probably most active at night. Eat mussels (5631)

Oceanodroma furcata (Gmelin) - fork-tailed petrel- (2341), (5631, p74-5)

Oceanodroma furcata plumbea (Peale) (5631)

Dist: Rare migrant and winter visitant from October 1 to March 12, probably more common offshore.

Remarks: Nests off Oregon and Alaska (5631).

Oceanodroma leucorhoa beali (Emerson) (5631)

Oceanodroma leucorhoa (Viellot) - Leach petrel- (2341), (5631, p75-77)

Dist: Summer resident on Washington coast. Winters in Puget Sound occasionally, Oregon (2341).

Remarks: Eats fish and crustaceans. Feed at night at least in breeding season. Found in burrows of colony during day. Formerly eaten extensively by Indians (5631).

Oidemia nigra americana (Swainson) - American black scoter - (5631, p150-51)

Dist: Migrant and winter visitor from Sept. 10 to May 15 in Washington and Puget Sounds, Strait of Juan de Fuca, in bays and along open coast. Nonbreeders observed occasionally on saltwater in summer (5631).

Pelecanus occidentalis californicus (Ridgway) - California Brown Pelican (5631, p79-80)

Dist: Found occasionally along coast from Columbia River to Puget Sound, in fall and winter.

Remarks: Nests on rocky islands. Seem to feed principally on rising tide. Eats fish (5631).

Phaethon aethereus Linnaeus - red-billed tropic-bird - (2341).(5631,p78)
Dist: Oregon (2341)
Remarks: Accidental visitor from tropics. Breeds on island in east tropical Pacific Ocean and in Caribbean and tropical North Atlantic (5631).

Phalacrocorax auritus (Lesson) - doubled-crested cormorant - (2341), (5631,p81-2)
Phalacrocorax auritus concinatus (Brandt) (5631)
Dist: Permanent resident along open coast. Does not breed south of Granville Arch. Oregon (2341).
Remarks: Nests early in May (5631).

Phalacrocorax pelagicus Pallas - Pelagic cormorant - (2341),(5631,p86-88)
Phalacrocorax pelagicus resplendens (Audubon)
Dist: Common permanent resident all along coast. Breeds from Cape Flattery south to Cape Disappointment, and islands off Washington and Puget Sound. Oregon (2341)
Remarks: Nests in May. Eats herring, smelt, flounders, bullheads, and other bottom fish, found in flocks. Nest on rocky islands (5631).

Phalecrocorax penicillatus (Brandt) - Brandt's cormorant - (2341), (5631,p83-4)
Dist: Permanent resident in Wash. waters. Breeds along coast and in San Juan Islands. Oregon (2341)
Remarks: Travel in flocks of 4-10. Found up to 10 miles from shore. Individuals observed among kelp beds or on rocks. Some eat flounders.

Phalaropus bulicarius (Linnaeus) - red phalarope - (2341),(5631,p285)
Dist: Spring and fall migrant along coast. Oregon (2341)
Remarks: Usually found well offshore. Abundant in open ocean, rarely seen on beach (5631).

Ptychoramphus aleutica (Pallas) - Cassin's auklet - (2341),(5585,p20)
Ptychoramphus aleuticus aleuticus (Pallas) - No. Cassin Auklet - (5631, p324)
Dist: Aleutian Islands to 27° lat. in California. Oregon (2341). Summer resident from May to August on islands off west coast of Washington, winters in open sea offshore (5631).

Ptychoramphus aleutica (continued)

Remarks: Travel in pairs. Active at night. Eggs laid in May and June in burrows on rocky islands. Eat copepods and shrimp also tiny fish. One of the worst enemies is a Tapeworm. (5631)

Puffinus bulleri Salvin - New Zealand shearwater - (2341),(5631)

Dist: Rare in No. Pacific. Nests near North Island, New Zealand (5631). Oregon (2341).

Puffinus carneipes Gould - pale-footed shearwater - (2341),(5631,p70)

Dist: Breeds in Australia and New Zealand. Found in No. Pacific in our summer (5631). Oregon (2341)

Puffinus creatopus Coues - pink-footed shearwater - (2341),(5631,p71)

Dist: Common off coast of Washington in summer (5631). Oregon (2341).

Remarks: Eats fish (5631).

Puffinus griseus (Gmelin) - sooty shearwater - (2341),(5631,p68-9)

Dist: Nests in New Zealand and Cape Horn in our winter. Migrates to North Pacific in April and May and remains until October. Oregon (2341)

Remarks: Remain in flocks and feed on schools of small fish (5631)

Puffinus tenuirostris (Temminick) - slender-billed shearwater - (2341), (5631,p69-70)

Dist: Breeds in southern Hemisphere and migrated to No. Hemisphere (5631). Oregon (2341).

Rissa brevirostris (Bruch) - red-legged kittiwake - (2341),(5631,p674)

Dist: Extremely doubtful record for Washington (5631) Oregon (2341).

Rissa tridactyla (Linnaeus) - black-legged kittiwake - (2341),(5631,p306-8)

Dist: Occasional spring and fall migrant and winter resident in Juan de Fuca. Rare on open sea (5631). Oregon (2341).

Stercorarius longicaudus Viellot - long-tailed jaeger - (2341)

Dist: Oregon (2341)

CHORDATA - AVES

Stercorarius parasiticus(Linnaeus) parasitic jaeger - (2341),(5631, p289-290)
Dist: Found in Puget Sound and Washington bays and over open ocean during spring and fall migrations. Oregon (2341).
Remarks: Attacks flocks of gulls forcing them to disgorge recently consumed fish. Then eats the pieces of fish (5631).

Stercorarius pomarinus (Temminck) - pomarine jaeger - (2341),(5631, p288-289)
Dist: Rare migrant from Arctic regions (5631). Oregon (2341).

Sterna forsteri Nuttall - Forster's tern - (2341),(5631, p309-10)
Sterna forsteri forsteri (Nuttall) (5631)
Dist: Summer resident in a few areas of Washington. Oregon (2341). Found on lakes only in Pacific Northwest. Breeds on sea coast on Atlantic seaboard. (5631)

Sterna hirundo Linnaeus - common tern - (2341),(5631, p311-12)
Sterna hirundo hirundo (Linnaeus) (5631)
Dist: Spring and fall migrant coastwise and on Puget Sound in Washington. Oregon (2341).

Sterna paradisaea Pontoppidan - Arctic tern - (2341),(5631, p312-13)
Dist: Probably uncommon migrant in Washington. (5631). Oregon (2341).

Synthliboramphus antiquus (Gmelin) - ancient murrelet - (2341),(5585, p22-3), (5631, p323-4)
Dist: Coast of North America. (5585). Oregon (2341).
Fairly common migrant and winter resident on Puget Sound and coast. (5631)
Remarks: Breeds from Aleutians to Near Island. Winters from Aleutians to San Diego, Calif. (5585). Eggs deposited singly in holes in banks along coast or on islands. Breed on Carroll Island in Washington (5631).

Uria aalge (Pontoppidan) - common murre - (2341),(5631, p317-19)
Uria aalge mornata (Salomonsen) (5631)
Dist: Common permanent resident along coast. Oregon (2341).
Remarks: Breeds in June and July. Nests in large colonies. Lay egg on bare rock, eats small fish, marine worms and other invertebrates. No evidence pointing to depradations on food fish (5631).

CHORDATA AVES

Uria troile californica (H. Bryant) - california murre - (5585,p26-7)
Dist: North Pacific coast. Winters from Aleutians to Santa Monica, Calif., breeds in Norton Islands to Farallons, Calif. (5585)
Remarks: Occurs in great colonies. Lays a single egg on bare rock.

Xema sabini (Sabine) - Sabine's gull - (2341),(5631,p308-9)
Xema sabini sabini (J. Sabine) (5631)
Dist: Rare spring and fall immigrant along the ocean coast (5631). Oregon (2341).

Class: MAMMALIA

Although every effort has been made to ensure that checklists of the mammals are complete, an exhaustive search of the literature has not been made with respect to the biology of the groups. Many of the species are widely distributed or migratory and the literature on them is scattered. Furthermore, their ability to maintain a constant body temperature makes them somewhat independent of variations in temperature like those which might be encountered from thermal pollution.

Balaenoptera acutorostrata (Lacèpedé) - little piked whale - (2395,p14), (2336,p30-31),(2341),(5632),(2962)
Dist: Western North Pacific from Bering Sea south at least to waters off Baja California (2395,p14)
Remarks: Usually seen alone. Eats herring, sandlance, and other small fishes (3804).

Baleanoptera borealis (Lesson) - pollack whate - (2395,p14),(5632),(2962) (sei whale)
Dist: Western North Pacific from Bering Sea south at least to waters off Baja California (2395,p14)

Balaenoptera physalus (Linnaeus) - common finback whale - (2395,p14), (2341),(5632),(2962)
Dist: Western North Pacific from Bering Sea south at least to waters off Baja California (2395,p14), common off Pacific coast.

Berardius bairdii (Stejneger) - baird beaded whale - (2395,p13),(2962)
Dist: Bering Sea south to near Ferndale, Humboldt County and Santa Cruz and Monterey Bay, Calif. (2395,p13)

CHORDATA - MAMMALIA

Callorhinus ursinus cynocephalus (Walbaum) - fur seal - (2395, pl8), (5632, p400-401), (5674), (5682)

Dist: Along entire west coast of Oregon north to Bering Sea and south to Ventura County, Calif. (2395, pl8)

Remarks: Usually found 10-50 miles off coast of Calif., Ore., Wash., in open ocean in winter. Breed in Pribilof Islands (5632); migration to Pribilofs in June; there the cows give birth to a single pup and are bred again. Males do not eat during breeding season (about 2 months), gestation is 12 months; female may travel up to 100 miles for food. Killer whales and large sharks take many young seals, 20% mortality due to nematode infections. Natural mortality in first year may be 70%. (5674)--1500 stomachs examined, 60% were empty. Herring is principal food during spring. In order of frequency, the 10 most important foods are: squid, pollack, herring, crustaceans, seal fish, salmon, rockfish, lamprey, greenling and cod. Seals must fast in summer or empty alimentary tract before coming ashore. Infants nurse on land for 4 months, take 1 quart milk at feeding. Fishermen have found seals at depths of 240-600 ft. (5682)--99% of stomach contents of 148 mature females collected in March and January was *Clupea pallasi.*

Delphinus bairdii (Dall) - Baird's dolphin - (2395, pl3), (2962)

Dist: Rare, in Eastern North Pacific recorded from Pacific Beach, Wash. and points along southern California (2395, pl3).

Enhydra lutris (Linnaeus) - Sea Otter - (2336, p38-9)

Dist: Rare, Aleutian area and southern Calif.

Remarks: Almost entirely aquatic. Eats mainly sea urchins and molluscs. Frequents kelp beds. One young born in April or May. Life spans about 8 years (2336)

Eschrichtius gibbosus (Erxleben) - Gray whale, baleen whale - (2395, pl4), (5506)

Dist: Eastern North Pacific from Bering Strait and Bering Sea south to Lagoons of Baja California (2305, pl4)

Remarks: Migrate north in Feb. (Off Wash. and B.C.) ending in May. Migrate south in December and January. Stay fairly close to shore. Do not seem to follow ocean

Eschrichtius gibbosus (continued)
currents. In feeding grounds in Bering and Chukchi Seas, eat benthic or near benthic organisms, mostly amphipods. Are in rather shallow water here (5506).

Eschrichtius glaucus - gray whale - (5632, p326-329)
formerly Rhachianectes glaucus
Dist: Arctic to southern California and Mexico.
Remarks: Filter feeder. Migrate south from Arctic during December and January to breed in lagoons in Baja California and Mexico. Half females breed each season since gray whale gives birth only once in every 2 years. Gestation period of 12 months. Middle of March to Middle of May, start northward migration. In breeding lagoons in southern Calif. eat herring. In Arctic waters eat amphipods.

Eubalaena sieboldii (Gray) - Pacific right whale - (2395, p14), (5632), (2962)
Dist: Eastern North Pacific from Alaska south to coast of Oregon. (2395, p14)

Eumetopias jubata (Schreber) - Stellar sea lion, northern sea lion - (2395, p18), (5512), (2336, p34-5), (2341), (5632), (5682), (5641)
Dist: Bering Sea south along Pacific coast of North America to lower California but mostly north of San Francisco. One was captured in a pasture near Oregon City, Oregon over 150 km. from the ocean. (2395, p18), (5641) Colonies on rocks near Golden Gate, Calif; Sea Lion Caves, Ore and other nearshore rocks.
Remarks: Pups born from late May to late June. Mating takes place in first week of July, more than 70% of sexually mature females are pregnant in any one year. Natural mortality is slight among pups. (5512). Eat lampreys, squid, sand lance, pollack, flounders, sculpins, cod, herring, small sharks, skates, perch and various scrapfish and small amounts of salmon, halibut, and sable fish. Eat much eulachon during spawning migrations of fish. One pup born with female. Suckled for 3 months. (2336). Found in remote, rocky places. Breed on the Farallons and Ano Nuevo Island off Central Calif. In 1938, 2000 lived on Channel Island off Calif. , but this declined to 50 in 1960. Presumably due to rising temp. of Calif. coastal waters. Channel Islands are the southern limit of this animal (5632). No scientific evidence to support idea they are detrimental to fishing industry (5632).

CHORDATA - MAMMALIA

Eumetopias stelleri
see *Eumetopias jubata*

Globicephala scammonii (Cope) - Pacific blackfish - (2395,pl4),(2692)
Dist: Eastern North Pacific from Alaska to Gulf of California (2395,pl4)

Grampidelphis griseus (G. Cuvier)- grampus - (2395,pl3),(2341)
Dist: Eastern North Pacific, possibly Oregon Coast (2395,pl3)

Kogia breviceps (Blainville) - pigmy sperm whale - (2395,pl3),(2693)
Dist: Eastern North Pacific from Grayland, Wash. south to Sinaloa, Mexico. (2395,pl3)

Lagenorhynchus obliquidens (Gill) - Pacific white-sided porpoise - (2395,pl3),(2692)
Dist: Eastern North Pacific, from Alaska southward off coasts of Pacific coast states (2395,pl3)

Lissodelphis borealis (Peale) - right whale porpoise - (2395,pl3),(2341), (2962)
Dist: North Pacific, recorded approximately 500 miles off mouth of Columbia River, Oregon (2395,pl3)

Lutra canadensis (Schreber) - river otter - (2336,p36-7)
Remarks: Live in dens close to water. Eat crabs, occasionally a fish or bird. One to five young born in March or April after gestation period of 2 months (2336)

Megaptera novaeangliae (Borowski) - humpback whale (2395,pl4),(2336, p2-9),(2341),(5632),(2962)
Dist: Eastern North Pacific from Bering Sea to Gulf of Panama (2395, pl4), Commonest whale off Pacific coast (5632)
Remarks: Breed in winter, one young born at a time. Eat mainly euphasiids, probably also takes small fish (2336).

Mesopladon stejnegeri (True) - Pacific beaked whale - (2395,pl3),(2962)
Dist: Rare, north Pacific south from Bering Sea to South Beach, Yaquina Bay near Newport, Oregon (2395,pl3)

CHORDATA - MAMMALIA

Mirounga angustirostris (Gill) - (elephant seal) (2395, p18), (2341), (5632, p407-8)

Dist: Baja California north, casually beyond northern California as far north as Vancouver and Prince of Wales, Alaska. (2395, p18)

Remarks: Breed and live in subtropical waters, southern California and Mexico, but stray to Alaska. Males fast during breeding season, December to March. Eat dogfish shark, rat fish, and squid. Large eyes seem to indicate seals hunt and feed below 300 ft. Main enemies are large sharks and killer whales, man, and parasites.

Orcinus orca Linnaeus - (killer whale) (2341), (5632)

Dist: Oregon (2341). All oceans (5632)

Remarks: Frequently hunt in packs and kill baleen whales. Hunt aquatic birds, seals, and porpoises (5632)

Orcinus rectipinna (Cope) - Pacific killer whale - (2395, p13), (2336, p23-24) (2962)

also known as Grampus rectipinna (Cope)

Dist: In eastern North Pacific; recorded from Bering Sea points south to coast of California (2395, p13)

Coll: B. C.: Cherry Point, Vancouver Island (2962); Wash: San Juan Islands (1929), Stanwood (1930), Vancouver (1931), (1940), Camano Isl. (1940), St. John's (1942), Copalis Beach (1942), Hat Island (1943)

Remarks: Travel in groups of 2-100. Eat seals, sea lions, porpoises, fishes, squids, and sea birds. Also attack larger whales (2692). Feed in dark, active inshore, and river mouths after nightfall.

Phoca vitulina richardii (Gray) - Harbor seal - (2395, p18), (2336, p32-3), (2341), (5632, p405-6), (2961) life history very complete

Dist: American side of North Pacific Ocean from east Bering Sea to northern Baja California (2395, p18)

Remarks: Seen close to shore in shallow bays and near river mouths. Haul out on rocky reefs or sand bars. Eat coarse fish, crustaceans and occasionally octopus. Infrequently take salmon; mate in summer. Gestation of 9 months and single pup born in late May or June. Birth is on isolated reefs or bars in mouths of rivers. Preyed upon chiefly by man and killer whale (2336).

CHORDATA - MAMMALIA

Phocoena phocoena Linnaeus - Harbour porpoise - (2341,p317-18)
Dist: Oregon (2341)
Remarks: Eats mainly fish. Also squid and crustaceans

Phocoena vomerina Gill - Pacific harbor porpoise - (2395,pl4),(2336, p25-6),(5682),(2962)
Dist: Eastern North Pacific form Bering Sea south to points off of Mexico (2395,pl4)
Remarks: Seen in inshore waters to 20 miles out. Eats herring and other small fish and squid. Mate in July - October. Gestation period of 183 days. Produce 1 young. (2336) (5682)--"a harbour porpoise taken near Port Townsend, Wash had fed entirely on herring."

Phocoenoides dalli (True) - Dall porpoise - (2395,pl4),(2336,p27),(2341), (5632,p317-18),(2962)
Dist: Eastern North Pacific from points off of Alaska south to Santa Barbara Channel, California; recorded 30 miles off Yaquina Head, Oregon (2395,pl4), not common except in North (2336)
Remarks: Eats herring and other small fish (2336). Eats entirely squid (5632).

Physeter catodon (Linnaeus) - (sperm whale) (2395,pl3),(2341),(5632, p314-16),(2962)
Dist: Eastern North Pacific from Pribilof Islands, Bering Sea south to Gulf of Panama (2395,pl3). Economically important (5632).
Remarks: Once were highly prized and hunted for the"spermacetti," from a reservoir on the head. Females live in tropical waters with calves. Males travel in summer to Arctic waters. Live 8-9 years. Eat mainly octopus and squid but also sharks and other fish. Today are hunted for ambergris, used as a base for the finest perfumes (5632).

Pseudorca crassidens (Owen) - False killer whale - (2395,pl3) (2962)
Dist: Eastern North Pacific from Puget Sound, Wash., south to Mexico (2395,pl3); pelagic, not usually found in Northeast Pacific (2962).

CHORDATA - MAMMALIA

Sibbaldus musculus (Linnaeus) - sulphur-bottom whale, blue whale - (2395,pl4),(5632,p329-30),(2962)
Dist: Eastern North Pacific from Bering Sea south at least to waters of Nicaragua (2395,pl4). Valuable species of whale (2062)
Remarks: In summer are found near polar icecap. Eats krill-filter feeder.

Stenella caeruleoalba Meyen (2341)
Dist: Oregon (2341)

Stenella styx (Gray) - spotted dolphin - (2395,pl3)
Dist: Eastern North Pacific from Bering Sea south to 10 miles south of mouth of Columbia River, Oregon (2395,pl3)

Tursiops gillii (Dall) - Pacific bottlenose porpoise - (2395,pl3),(5632,p316-17)
Dist: Eastern North Pacific; recorded only as far north as Monterey, California, but possibly along Oregon coast. (2395,pl3).
Remarks: Gestation period 12-13 months. Does not breed until it reach the age of 4 years. Eats several kinds of shoal fish.

Zalophus californianus (Lesson) - California sea lion - (2395,pl8),(5527), (2341),(5632,p404-5)
Dist: Mexico to California; regularly found northward to central Oregon and perhaps the mouth of Columbia River. (2395,pl8)
Remarks: Feed on sauries (5527). During breeding season, males gather harems of around 10 cows. Mate between May and August. Gestation 1 year. Killer whale and man are the largest predators. No scientific evidence to bear out claim that they are detrimental to commercial fishing. Eat mainly non-commercial fish, mollusks, and crustaceans. Breed from around Monterey, south. Ranges from Mexico to Vancouver Isl. Males and females have different patterns of movement along Calif. coast. Males go north to around Barkeley Sound in winter. (5632).

CHORDATA - MAMMALIA

Ziphius cavirostris (G. Cuvier) - Cuvier's beaked whale - (2395,pl3)
Dist: Eastern North Pacific; Alaska to San Diego; recorded from Oceanlake, Lincoln County, Oregon (2395,pl3)

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